The FOUNDRY

Contents

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	PAGE
Editorial	21
A Little Knowledge Is a Dangerous Thing *By John Howe Hall*	22
Cast Soil Pipe Centrifugally *By Herbert H. Farr*	24
A.F.A. Selects Chicago for 1940	27
Measure Deformation of Molding Sand *By Harry W. Dietert*	28
Safety Measures Pay Dividends in Brass Foundry *By M. A. Gimbel*	30
Many Nonferrous Alloys Available *By N. K. B. Patch*	32
Why Not Make Better Cores? *By Leroy P. Robinson*	33
Questions and Answers	34
Men of Industry	38
Activities of Foundry Groups	42
The Adventures of Bill *By Pat Dwyer*	50
Among Detroit Foundries *By A. H. Allen*	54
International Congress Papers Discuss Many Problems	58
Readers' Comment	78
Foundry Developments at Short Range	82
Abstracts from World Literature	85
New Equipment and Supplies	86
Obituary	94
Foundry Activities	96
New Trade Publications	98

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Editorial

Castings Will Be Featured at Machine Tool Show

WHILE the National Machine Tool show, to be held in the Cleveland Public Auditorium and Exhibition hall, Oct. 4 to 13, is of direct interest to foundries maintaining machine shops, the event has far greater significance for the foundry industry as a whole. In all probability, that important industrial show will be the greatest exhibition of castings ever assembled for the inspection of users and prospective users of cast parts.

As a result of remarkable progress in the production of castings capable of meeting exacting requirements of modern industrial design and application, the vast majority of machines to be shown at Cleveland will be constructed of castings, from the simplest of parts to the most complicated shapes. In addition, many of the machines shown in operation will demonstrate the machining of castings. The Machine Tool show should be a source of inspiration and pride in the accomplishments of the foundry industry. At the same time it offers an excellent opportunity for foundrymen to study certain present applications of other forms of fabrication from the viewpoint of developing improved casting designs which will meet the needs of machine tool manufacturers better than the materials now in use.

Publicity for various types of castings at the 1939 show will extend much further than at any previous exhibit of machine tools. In addition to the extensive display of castings already discussed, and the individual exhibits of several progressive manufacturers of castings, an exhibit of the progress and products of the foundry industry is being sponsored by the American Foundrymen's association in co-operation with the Gray Iron Founders society, Malleable Founders society and Steel Founders Society of America.

Scientific control of foundry operations and products will be demonstrated by the association in the center of an 82-foot exhibit. On each side the three societies and the nonferrous division of the association will display a wide variety of cast products and illustrate physical properties to be found in each of the particular types of castings.

Further publicity for castings is provided in a session of the Machine Tool Congress on Monday evening, Oct. 9, and devoted to "Castings as Engineering Materials." The program for the meeting, arranged by a committee of the A.F.A., will include talks by Dr. H. A. Schwartz on malleable, A. C. Denison on gray iron and James Thomson on steel.

The foundry industry should derive enormous benefits through this co-operative exhibit and meeting staged for important industrialists and engineers of the country.

Chicago in 1940

DECISION of the board of directors of the American Foundrymen's association to hold the 1940 annual convention and a major exhibition of foundry equipment and supplies in Chicago sets the stage for one of the largest gatherings of foundrymen in the history of the association. The city on the Southern shore of Lake Michigan, through situation and facilities, provides many advantages for staging a most successful foundry convention and exhibition.

Chicago is located in the center of a great foundry region, where exceptional interest is displayed in activities of the A.F.A. Of the 17 chapters now functioning as a part of the association, the following eight are located within a 300-mile radius of the convention city: Chicago, Cincinnati, Detroit, Michiana, Northern Illinois-Southern Wisconsin, Quad-City, St. Louis district, and Wisconsin. In addition, a portion of the territory served by the Northeastern Ohio chapter is within that circle.

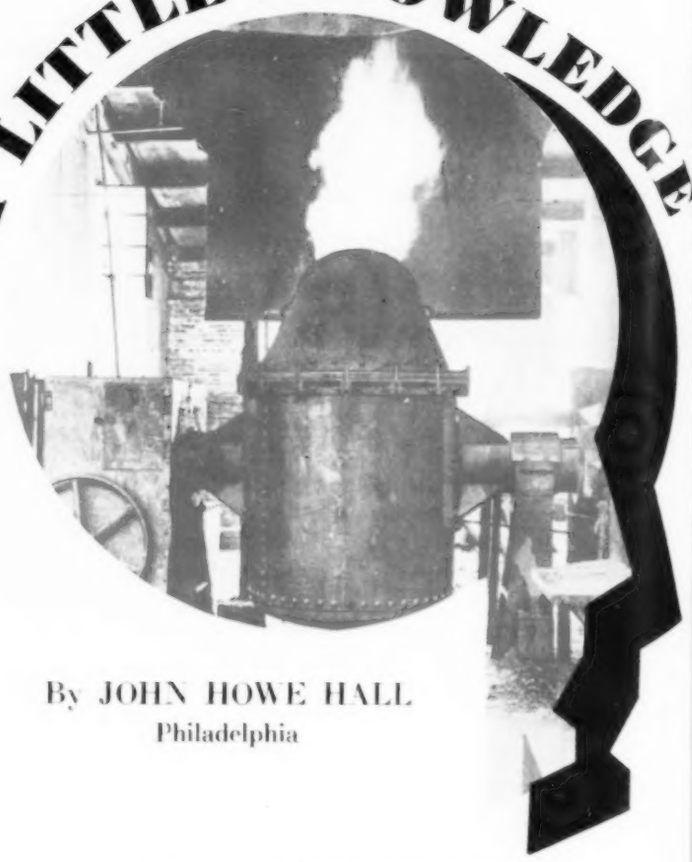
Chicago, the top ranking foundry city in the United States with 153 establishments producing a wide diversity of products, offers exceptional possibilities for a most interesting and valuable plant visitation program. Arrangements for plant inspection and other features of the program will be in charge of committees of the Chicago chapter, which was the first group to be organized in the association.

Developments in the field of foundry equipment and supplies since the Cleveland show in 1938 will feature the exhibition. Facilities of the International Amphitheatre and adjoining buildings are ample for the exhibition, technical sessions, luncheon meetings and other events of the convention. Chicago's many fine hotels should give convention visitors a wide selection.

In addition to breaking records, the 1940 convention and exhibition in Chicago should prove of great value in the further progress of the foundry industry.

Frank G. Steinebach
Editor

A LITTLE KNOWLEDGE



By JOHN HOWE HALL
Philadelphia

Photo courtesy Whiting Corp., Harvey, Ill.

MOST people familiar with the subject know that electric furnace steelmaking in this country, began with basic lined furnaces. In general, practice followed the routine worked out abroad, in which steel scrap, comparatively high in phosphorus and sulphur, was melted under an oxidizing slag, which was scraped or run out of the furnace as soon as the charge was melted, taking with it much of the phosphorus originally present in the scrap. A new slag was then made up from lime, sand and fluorspar, the charge brought to a high temperature, and metal and slag deoxidized as thoroughly as possible by successive additions of ground petroleum coke spread over the slag as evenly as possible. Frequently some coke also was mixed with the first batches of material added to form the second slag to start deoxidation as promptly as possible. When the slag was deoxidized thoroughly, it was cream colored or white on a fractured surface, and would go to powder as it cooled on the test spoons and bars used in working the heat. To ensure complete deoxidation, it generally was customary to continue addition of coke until calcium carbide was formed in the slag, giving it a dull black color and causing it to give off acetylene gas when moistened with water. It was quite usual to see the melter sniffing for the acetylene odor when cooling the rods used to stir the bath and the slag.

Reduces Sulphur Content of Steel

Deoxidizing conditions established under the second slag also resulted in a considerable reduction of the sulphur content of the steel, so that the product of that rather long drawn out two-slag method was low in phosphorus and sulphur, and very low in dissolved oxides.

Variation of that practice consisted in melting down on a basic hearth, scrap low enough in phosphorus (and generally sulphur also) to suit the specifications, and establishing deoxidizing conditions as soon as possible, without removing the melt-down slag to reduce phosphorus content. Thorough deoxidation was sought for and generally attained. For practical purposes the steels produced with and without slagging-off were identical in nature.

According to the conceptions of steel making then held by leading authorities, the metal so produced was of the highest possible purity, rivaling the product obtained by crucible melting of pure raw materials. Basic electric steel so produced soon displaced crucible steel for carbon and alloy tool steels, and other alloy steels for the manufacture of high quality forgings and rolled bar. For high grade steels of that class, the electric furnace has nearly if not quite monopolized the field in recent years.

Shortly before the world war, the electric method of steel making was introduced into the steel foundry industry, where it came into competition chiefly with the crucible and the side blown converter processes for the production of small heats of steel for comparatively light castings. The converter then was nearing the height of its popularity in that field, and rapidly was displacing the more costly crucible process. At the peak of converter production in 1918, 180,145 net tons of converter castings were produced in the United States. Crucible production had fallen from a peak of 23,016 tons in 1912 to only 1490 tons in 1918. Electric steel casting production had jumped from 343 tons in 1909 and 4661 tons in 1912, to 121,292 tons in 1918. The next year, electric production passed that of the converter, and after 1920 converter production fell off rapidly.

List Processes in Order of Tonnage

In view of the foregoing figures for tonnage in the various years, a somewhat anomalous situation is revealed by a study of the history of the *process clause* in the American Society for Testing Material specification for steel castings. In the 1918 standards of that society, that clause still called for "open-hearth, crucible, or other process satisfactory to the purchaser." Only in 1921, when crucible production had shrunk to less than 1000 tons, and converter output had also taken a nose dive to 43,466 tons did "open-hearth, electric furnace, side blown converter or crucible," become the recognized processes. That language is consistent in at least one respect. It lists the processes in order of their tonnages. The belated recognition of the converter process by name, after its total yearly output had decreased to about one-fourth of the 1918 maximum, is curiously inconsistent. In the light of later happenings in the

Is A Dangerous Thing

A.S.T.M. this is clearly seen not to have been merely accidental.

In 1925, the American Society for Testing Materials adopted its specification *A* 95-25*T*, for valves, flanges and fittings for high temperature service. The same process clause was incorporated that was adopted in 1921 for general steel castings. That specification, from the time it was under discussion in the years 1924-1925, to midsummer 1929, was the subject of one of the bitterest and hardest fought struggles in the history of the A.S.T.M. The upshot of the fight was the adoption of a process clause in that specification, limiting production to "electric furnace, open-hearth, or other process approved by the purchaser." The order of mention was due to the fact that by far the greatest proportion of castings made under that specification was poured from electric furnace steel. The combination of higher costs and growing sales resistance made the situation almost hopeless for the converter, and naturally it was not made any better by the exclusion of the process from that specification on the ground of inferior quality.

Shift from Basic To Acid

Not long before the discussion started, about 1922 or 1923, users of electric furnaces in foundries had shifted their production from basic to acid methods. Motives for the change included lower costs and higher output on acid bottom, less difficulty in keeping the sticky slag out of the molds, and greater fluidity of metal which made it easier to produce large tonnages of small castings. Thoroughly deoxidized basic electric furnace steel, though of undeniably higher quality when carefully made, generally is conceded to present much greater difficulties than acid steel in running light work. Even the first shankfulls taken from a ladle of basic steel do not run as freely as acid steel, and the metal soon cools too much to permit the shanking of light work.

To correct some of the pouring troubles associated with thoroughly deoxidized basic electric steel, some operators in this country had begun to develop the one slag method with incomplete deoxidation which already had been used abroad with good results, especially in England, where Frederick A. Melmoth and the late George Batty had much to do with its introduction and development. These two pioneer metallurgists were among the first, if not the first, to recognize and describe the dangers of using what they called over-reduced basic steel in steel casting manufacture. To them should go the major share of credit for the discovery that basic electric steel, as then made for ingots, was not a suitable, or at least a desirable material for the production of steel castings. In many English shops, this procedure had entirely replaced the older practice with complete deoxidation.

This method of operation differed from the one slag with deoxidation process only in the method of finishing the heat. Much less coke was added to the slag. Every effort was made to avoid complete deoxidation and a powdering or carbide slag, and the slag was kept slightly oxidizing and brown in color until the steel was tapped. Metal so produced resembled acid electric steel rather closely and was freer running and would pour a greater number of very light castings than the basic steel made under the older methods. In its properties, it was closely similar to acid electric steel as made today by the most modern methods. However, rapid adoption of the acid method for the most part relegated this modification of basic electric practice to the background in this country.

As at first produced by most operators, acid electric steel was melted down quite low in carbon, with little boiling unless the heat melted too high in that element. The slag and steel were deoxidized as rapidly as possible with additions of ferrosilicon, and if necessary the carbon was adjusted with pig iron. Some manganese was added in the furnace, but the greater part was shoveled into the stream during tapping to avoid excessive losses. Aluminum was added in the ladle. Difficulties consequent upon that practice will appear later in this discussion.

Steel Sailing Under False Colors

The electric furnace steel used for castings during the historic A.S.T.M. fight, therefore, was acid steel, sailing under the false colors of the high quality of deoxidized basic electric steel, carelessly assumed by engineers to be characteristic of electric steel in general. Experience with acid methods had been too short to establish the true nature of the product, and as a matter of fact, the users of the process were even then struggling with that bugaboo of metallurgists, aluminum embrittlement or the low ductility of a certain proportion of the steel made. Not for nearly 10 years, 1932 to be exact, was a logical explanation of this phenomenon found, and even today we do not know the (*Please turn to page* 69)

CAST SOIL PIPE *Centrifugally*

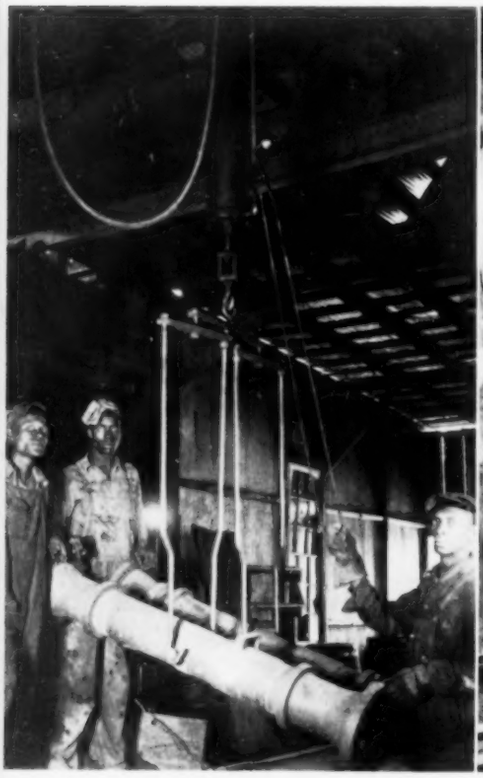
A BRIEF review of the methods and equipment employed universally in American soil pipe foundries for the past 50 years may be appropriate before considering a radically new departure instituted about 2 years ago in which molds without cores are employed and where the metal is distributed by centrifugal force in a rapidly revolving mold.

Soil pipe castings are made with a hub or bell at one end and a spigot at the other end. In some instances the pipe has a bell or hub at each end. Laying length for a single hub pipe is 5 feet and for double hub, 5 feet less the length of one hub. Pipe is graded according to three weight classifications, standard, medium and extra heavy with wall thickness ⅛, 3/16 and ¼-inch respectively. The standard, that is the lightest grade, is used more extensively than the other two. Output of that grade is approximately 75 per cent of the total. Medium weight pipe usually is shipped to Cuba, the Philippines and other countries where soil, temperature and other factors differ from those in the United States.

Internal diameter of all three classes is the same. External diameter is varied to secure the desired wall thickness and weight. Considerable saving to manufacturer and consumer could be effected if this practice was reversed. Steel pipe makers keep the outside diameter constant and vary the inside diameter to get the proper weight and wall thickness. One of the advantages is the interchangeability of parts.

According to what may be considered the standard or orthodox method in soil pipe foundries, the patterns up to 6 inches diameter are mounted in pairs on a movable stripping plate machine. Larger sizes are mounted singly. Patterns are supported on cams,

Fig. 1 (Lower Left)—Metal molds are picked up two at a time by special slings attached to an equalizer beam at the top, and carried to the ramming station. Fig. 2 (Center)—The molds are turned to a vertical position and placed on the ramming stools which also serve to center and locate the metal patterns lowered into place with a hoist. Fig. 3 (Right)—Sand is shoveled by hand into the top of the mold through a special cup or basin on top which distributes it uniformly around the pattern. The sand lining in the mold serves as insulation to prevent chilling of the pipe. Castings made in these molds do not require subsequent annealing treatment



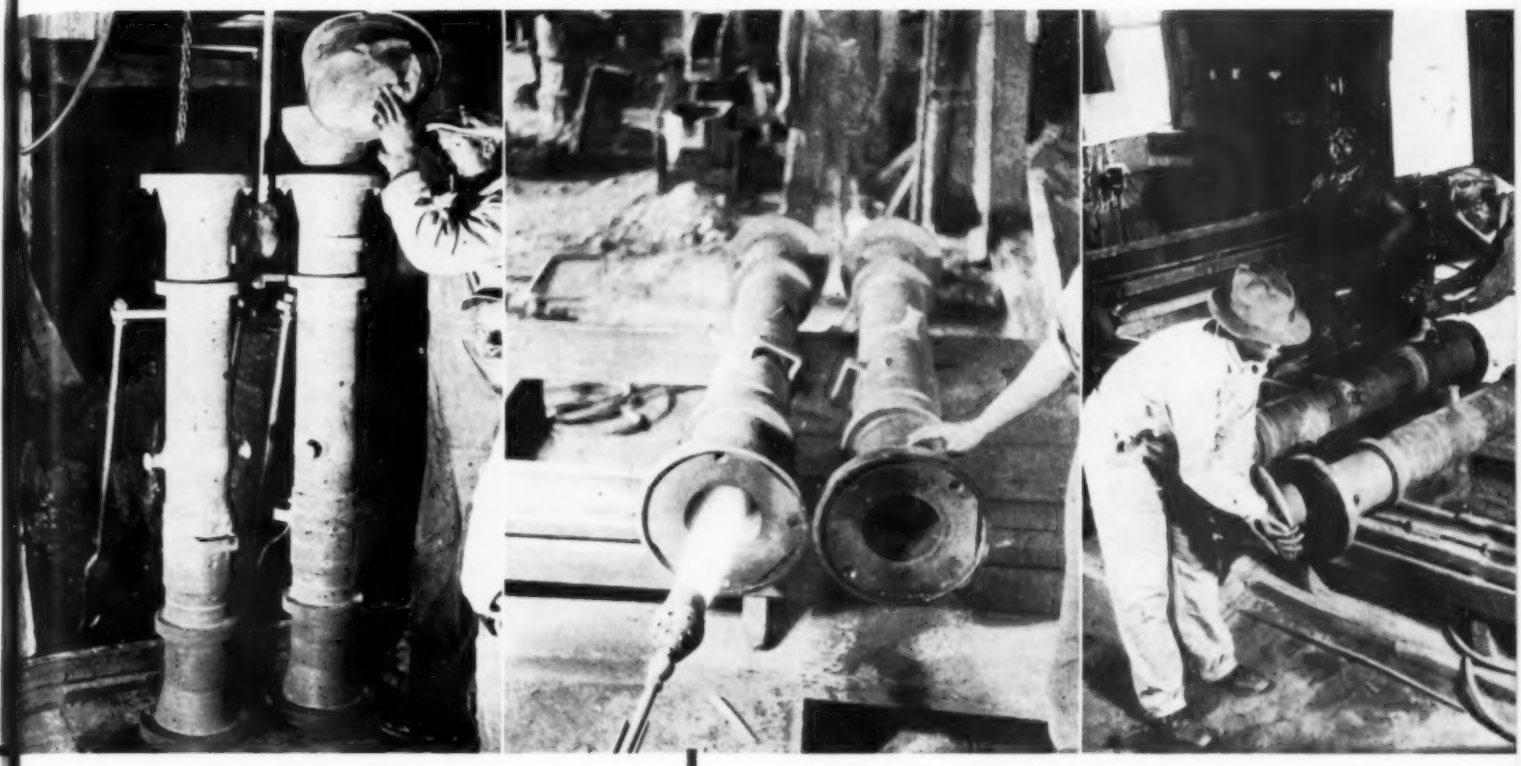


Fig. 4 (Upper Left)—A coat of blacking is applied to the sand surface of the mold by spilling the liquid blacking from a pail into the open top. A closely fitting plunger set first near the top, gradually is lowered and in this manner the blacking is distributed from top to bottom. Fig. 5 (Center)—The wet blacking is dried with a blow torch while the molds are in a horizontal position. Fig. 6 (Right)—A dry sand hub core is placed in one end of the mold to form the bell on the casting. The core is clamped in place before the molds are picked up by the trunnions and placed in the spinning machine

known as tumbling bars, connected to links actuated by a lever. After the mold is rammed the patterns are lowered a short distance through the stripping plate before the mold is removed. This insures a clean lift. The machine is mounted on wheels and travels on a path provided for the purpose, a concrete runway faced with 2 x 12-inch planks. The machine follows the receding sand heap from one end of the floor to the other. Molds are laid down in a straight row so that the center line of the flasks will come directly under the monorail from which the ladles are suspended. These ladles provided with four lips pour the metal into four sprues in the cope of each mold.

Molders work in pairs. The sand is shoveled and rammed by hand. The men lift the flasks, close the molds and pour the iron. About 65 flasks or 130 pieces of 4-inch pipe is a day's task. This is slightly over a ton of pipe per man per day. Two molders, putting up molds for 4550 pounds of pipe per day, handle by hand approximately 53,300 pounds of equipment and sand, nearly 12 times the weight of the pipe produced. These figures do not include work incidental to pouring and ramming.

A separate gang shakes out the castings, stacks the flasks, removes the castings and prepares the sand. Two men make cores for six floors with practically the same type of machine developed in 1887 by John Foran. Four men handle the arbors, distribute and set the cores in the molds. All men are paid on a piece rate basis. An average molding sand shows moisture 8 per cent, permeability 25 and a clay content of 15 per cent.

Cores Are Swept Up

In the coremaking machine as invented by Mr. Foran, cores are turned or swept in a modified form of lathe. A bucket type elevator lifts the sand into a hopper provided with a narrow orifice about 12 inches above the core bar or arbor. The sand falls in a thin stream on a clay washed arbor revolved by a coremaker. A stationary strike develops the outside contour of the core. As the cores are made they are taken to the molds where they are set into position. An average core sand shows moisture content of 6½ per cent, permeability 80. This sand is more open than that used for molding.

Green sand cores are used exclusively in making both the straight pipes and the fittings. Cast iron patterns are exactly like the desired fittings except that they are split longitudinally through the center, provided with dowel pins and are slightly larger than the proposed castings, to compensate for the antici-

By HERBERT H. FARR
Engineer
Sanitary Pipe Co., Alexander City, Ala.

Fig. 7 (Left)—The proper amount of metal for a casting is poured from a hand ladle into a pouring spout shown more in detail in Fig. 9. Fig. 8 (Right)—After the metal in the casting has solidified the mold is removed from the spinning machine

pated shrinkage. This pattern makes mold and core at the same time. The drag half of a pattern is placed on a follow-board and the drag rammed and rolled over in the usual manner. A small quantity of sand is placed inside of the half pattern and the cast iron core arbor is pressed into place. The second half of the pattern is then adjusted, after which sand is packed into the pattern through the openings.

Fig. 9—From a blueprint showing the general assembly and many of the details of the spinning machine in which the mold revolves rapidly during the pouring operation

The cope is rammed and lifted off. The top half of the pattern is removed. The core is lifted out and placed on a stand. The drag half of the pattern then is removed after which the mold is reassembled. Special snap flasks holding a minimum volume of sand are used.

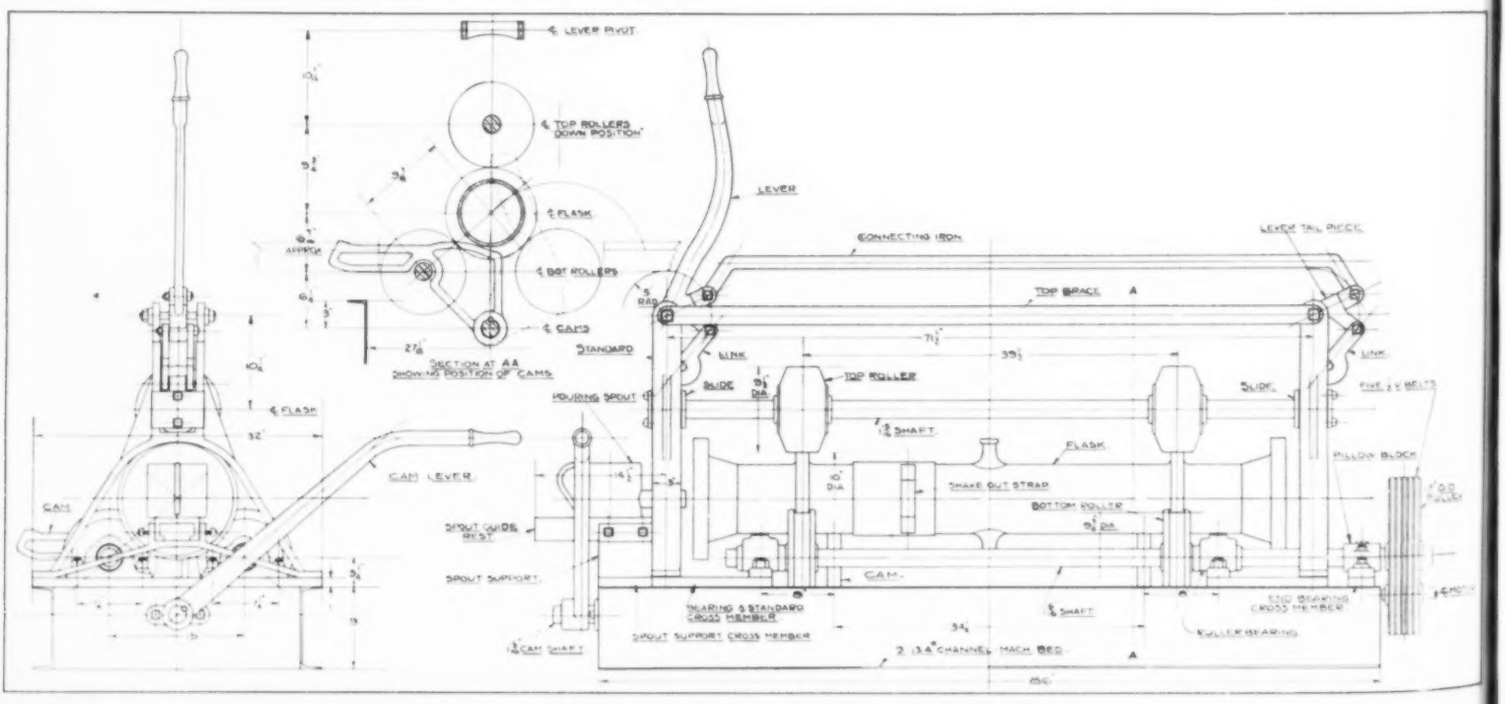
Fitting molders pour their own iron and are also paid on a standard piece rate basis. The price rates are the same in all southern soil pipe foundries.

Iron is melted in the conventional type cupola and usually is charged by hand. The usual mixture is 60 per cent pig iron and 40 per cent scrap, consisting of some purchased scrap with returns, gates and foundry rejects. The cupola charges are made up on trucks running on narrow gage tracks in the yard. An elevator carries the trucks to the charging platform provided with transfer tracks by which the loaded cars are switched in front of the cupola charging door, and the empty cars are returned to the elevator. Materials are charged to yield an analysis of silicon 1.75 to 2.00 per cent, sulphur 0.07 per cent, phosphorus 0.75 per cent and manganese 0.45 to 0.50 per cent, total carbon 3.40 to 3.50 per cent. The molten iron, skimmed and slagged in front, falls first into a reservoir trough mounted on trunions and from there into the pouring ladle. Our cupola lined to 42 inches melts approximately 50 tons over a period of 7 hours, or at a rate of approximately 7 tons per hour. Charges include 1500 pounds of metal to 200 pounds of coke, a ratio of 7½ to 1.

Pipes and fittings are cleaned in tumbling mills, after which the gates and fins are ground off. They are tested at 50 pounds pressure per square inch and then sent to the dipping vat where they are heated and given a coat of coal tar asphaltum.

Foundry rejects, depending a great deal on the condition of the equipment run from 5 to 10 per cent. Proper maintenance of equipment is extremely important.

Two years ago the Sanitary (*Please turn to page* 72)



A.F.A. SELECTS *Chicago* FOR 1940

FORTY-fourth annual convention and exhibition of the American Foundrymen's association will be held in Chicago, May 6 to 10 inclusive, according to a recent announcement of C. E. Hoyt, executive vice president. Decision to hold the 1940 convention in the Mid-western metropolis was made recently by the board of directors of the association, upon invitation of various civic organizations of Chicago. The invitation was strongly supported by the Chicago Chapter of the A.F.A., the first of the chapters to be organized under the sponsorship of the association. The Chicago convention next year will mark the fifth time in as many years that an A.F.A. chapter has co-operated with the association officers in staging an annual convention. Previous hosts were Detroit, Milwaukee, Northeastern Ohio and Cincinnati chapters.

The Chicago convention will feature a major exhibition of foundry equipment and supplies in the exhibition halls of the International Amphitheatre of the Union Stock Yards & Transit Co., located three miles from the Loop, and quickly reached by elevated and surface car lines, bus or automobile. The Amphitheatre has available 255,000 square feet of exhibit space. The International Amphitheatre replaces the old Dexter Pavilion which burned several years ago, and was the scene of a previous A.F.A. exhibition in 1914. The amphitheatre and surrounding building were designed to provide all convention requirements such as exhibit halls, meeting rooms, restaurant facilities, transportation and free parking.

Chicago, the leading foundry center in the United States in number of establishments, offers unusual facilities for plant visitation. Committees of the Chicago chapter plan to provide a plant visitation program probably more diversified in types of establishments available for inspection than ever before has been offered convention visitors. Possibility of inspecting almost any type of foundry in operation should provide one of the important attractions of the program for foundry week.

An exceptional technical program is being planned by the association officers. Daytime sessions will be held in the various meeting rooms of the amphitheatre, and in the Stock Yards inn and the Saddle and Sirloin club. Evening meetings and the annual dinner of the association will be held in the Palmer House, which has been designated the headquarters hotel.

The exhibition will open Saturday noon, May 4, for Chicago Day, with the Chicago chapter co-operating. The show will be closed on Sunday, May 5, and will reopen on Monday, with the opening of the convention.

Palmer House has been designated the headquarters hotel

MEASURE Deformation

WITHIN the past decade many improvements have been made in methods of sand preparation. Today the foundryman is as familiar with sands and their limitations as he is with his metals. As with other materials, sand deforms under load. This plastic ductility allows molding sand to respond quickly to the processing operations in making a mold. Amount of water and type of bond to a great degree determine the ductility, commonly referred to as deformation.

Amount of deformation possessed by a molding sand depends almost entirely on the bonding constituents. Sand grains deform little, if any, under the pressures applied in normal foundry usage. Therefore the clays, bentonites and cereal binders account for all the plastic deformation. This deformation is measured on the rammed test specimen as prepared for the standard A.F.A. green test strength. This property easily as measured by attaching a deformation accessory to the strength machine as illustrated in Fig. 1.

The ultimate or breaking load of a molding sand is the accepted measure of the green strength. This test alone gives but part of the true working strength.

Fig. 1 — Sand strength testing machine with deformation accessory

Linear change of length at the breaking point is the measure of deformation. This change may be as low as 0.005-inch for a brittle sand, or upward to 0.040-inch for a plastic bonded sand, for example, sands bonded with large amounts of bentonite, clay or cereal binders.

A deformation must exist before a portion of a mold drops or breaks. Where this deformation exceeds the pliability of the bond, a break occurs in the continuity of the sand and the maximum strength has been exerted. From this view point it is obvious that both deformation and strength must be considered when measuring the workable strength.

In the science of sand control, as in every other science, greatest usefulness is not attained until it has been reduced to a simplified working form. The chart, illustrated in Fig. 2, shows the working areas for various types of castings as defined by deformation and green compression strength. A scale also is shown whereby the approximate workable moisture content may be determined.

Workability of a sand should be controlled through deformation and strength to fall within the narrowly defined areas shown on Fig. 2. The green strength is to be measured as well as the deformation. On the deformation-strength-moisture chart Fig. 2, the point can be located where the lines showing these properties intersect. With the point of the present workability of the sand located, properties then can be varied to move this point up or down to improve the workability. Knowing the grain fineness and grain distribution and more especially the total percentage of grains passing the 140-mesh sieve, the percentage of water required for tempering the sand may be calculated accurately.

Sand Causes Casting Defects

Where the point falls to the left of the line *ADE* the sand is rotten, dry or brittle and will cause casting defects, dropping of sand projections, swells, cutting or washing of the mold by the metal. In many cases the mold will break.

Should the point fall in the area *A*, and preferably on a line slightly nearer to the line *BG*, the sand under normal foundry usage will serve satisfactorily and will be responsible for very few defective castings.

Some sands, natural and synthetic, have been known to produce mold wall peeling when worked dry and weak. These have properties falling in the area *D*. This condition is aggravated in low refractory sands. Curved line *BG* shows the limit to which clay bonded sand can be worked. By soft ramming or with additions of sea coal the workable range can be extended to include the area *B*. Beyond these green sand limit lines, skin drying or oven drying is required to stabilize the mold surface.

Moisture-Deformation Table

Deformation per inch	Clay Bonded Sand with less than 10 per cent fines Moisture per cent	Sand with more than 10 per cent fines Moisture	Clay, Bentonite Bonds with Cereal Binders Moisture for green sands
0.004	3.5	Add to figures in column at left Per cent fines 19.5	Divide figures in first column by 1.8 For dry sand facing, add 1.5 per cent to above green figures.
0.008	4.0		
0.012	4.5		
0.016	5.0		
0.020	5.5		
0.024	6.0		
0.028	6.5		
0.032	7.0		
0.036	7.5		
0.040	8.0		
0.044	8.5		

As a general rule, foundry facing sands containing some cereal in addition to the usual bentonite or clay bond, have higher deformation values as shown in the accompanying table. Further simplification may be made when the deformation values are multiplied by the green compression strength. In this manner these two important test values may be combined in a single figure to express the workable strength. In the past this workable strength figure was termed sand resilience. At the suggestion of Prof. A. C. Davis, Cornell university, it is proposed to change this term to sand toughness as being more properly descriptive.

Sand toughness = Strength × Deformation × 1000 where deformation is expressed in inches per inch of length plus deformation at ultimate load.

Toughness Affected by Many Elements

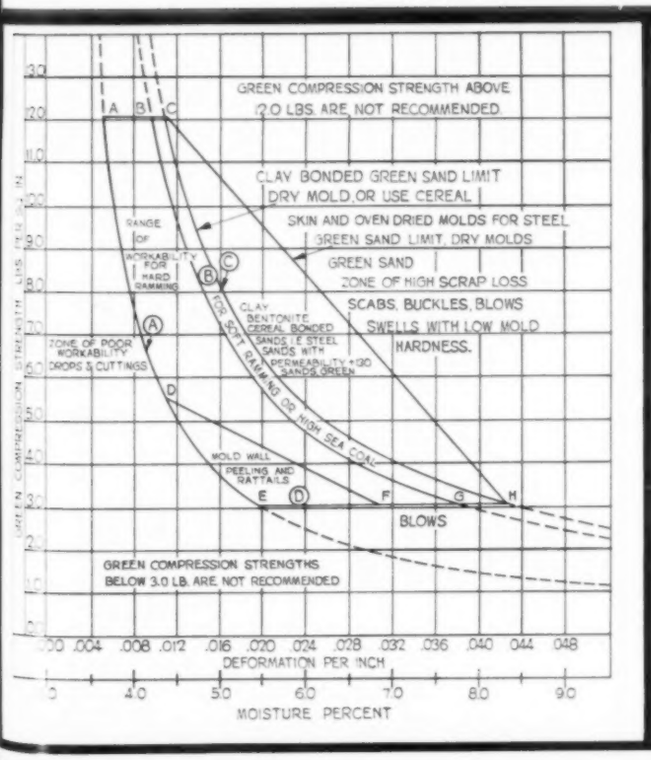
Since sand toughness is a product of two properties it is affected by the many elements within the sand mixture. Workability of a molding sand thus can be influenced by variations affecting g r e e n strength and deformation. For example green strength is influenced by clay content, grain size, grain distribution, percentage of fines, amount of mixing. Deformation is influenced by moisture content, type of clay, organic binders, tempering time. From this listing it readily can be seen that a variation of any one property will enter into the mathematical relationship of calculating toughness value.

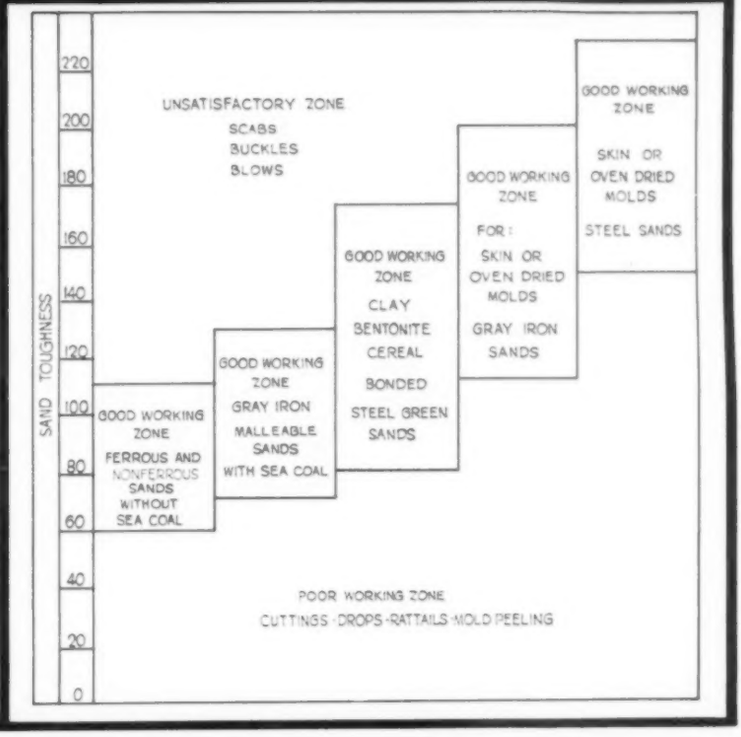
What troubles are to be expected when sand possesses a low or high toughness value? Limits will be understood better if some of the responsible properties are cited. For example, a sand possessing a low toughness, well might have a high green strength, but due to a lack of tempering, water or active bond, is low in workability. The sand is brittle. Under normal handling the mold will break, or the sand will wash or cut before the metal. This high strength sand tempered with an excess of moisture quickly develops a high deformation value. The resulting high toughness indicates properties which promote the formation of scabs and buckles. When this sand passes through the expansion and contraction cycle incident to heating by the molten metal, one or both of these properties will be high. Resulting stresses on the skin of the mold will cause it to tear. The only way to overcome these abnormal properties is to stabilize the mold surface by drying, or by adding low burning point materials, (*Please turn to page* 70)

Fig. 2—(Lower Left)—Deformation-strength-moisture diagram for foundry facing sands. For sands containing more than 10 per cent fines add to moisture indicated in chart, fines 19.5. For high plastic bonds and cereal binders or blends divide moisture shown in chart by 1.8 for green steel sand molding. For dry molding sand add to this 1.5 per cent moisture. Fig. 2—(Lower Right)—Safe working limits for toughness of molding sands

OF MOLDING SAND

By HARRY W. DIETERT
and
E. E. WOODLIFF
Harry W. Dietert Co., Detroit


GREEN COMPRESSION STRENGTH ABOVE 12.0 LBS. ARE NOT RECOMMENDED
CLAY BONDED GREEN SAND LIMIT DRY MOLD OR USE CEREAL
SKIN AND OVEN DRIED MOLDS FOR STEEL
GREEN SAND LIMIT, DRY MOLDS
GREEN SAND
ZONE OF HIGH SCRAP LOSS
SCABS, BUCKLES, BLOWS
SWELLS WITH LOW MOLD HARDNESS.
RANGE OF WORKABILITY FOR HARD RAMMING
FOR SOFT RAMMING OR HIGH SEA COAL
CLAY BENTONITE CEREAL BONDED SANDS I E STEEL SANDS WITH PERMEABILITY +30 SANDS GREEN
ZONE OF POOR WORKABILITY DROPS & CUTTINGS
MOLD WALL PEELING AND RATTAILS
BLOWS
GREEN COMPRESSION STRENGTHS BELOW 3.0 LB. ARE NOT RECOMMENDED
DEFORMATION PER INCH
MOISTURE PERCENT



Safety MEASURES PAY

DIVIDENDS IN BRASS FOUNDRY

By M. A. GIMBEL
Safety Engineer
General Electric Co.,
Philadelphia

GENERALLY speaking, disability of workmen to carry on their usual occupations is due to one of three causes: Doing things they know are wrong; doing things they do not know are wrong; conditions which are beyond their control.

These three elements are present in the prevention of occupational disease and a great amount of thought must be given to each. The field presents complex problems, many of which are not fully understood, or are still in the process of experimentation. Industry has made a good start toward protection of the health of the worker by applying protective equipment and improving general conditions. Problems of each company are somewhat different from others because of the nature of the work, but the principles in each instance are about the same. Present discussion will be limited to methods used in the nonferrous foundry of the General Electric Co., Philadelphia.

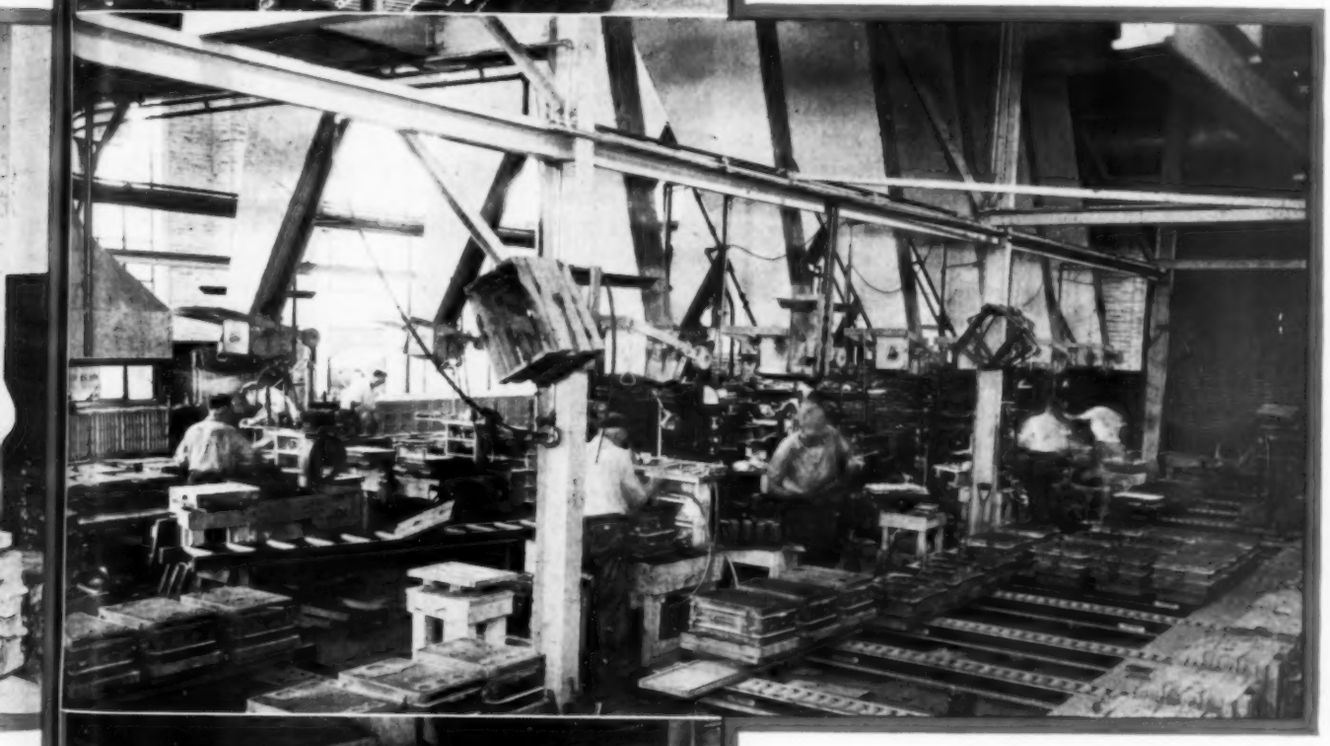
What can be done with the physical layout in a small foundry may not be practical in a large one. What applies to a nonferrous foundry may not work out in an open hearth plant or a rolling mill. However, a knowledge of advancements made in the art should be of value. Interchange of information with a discussion of the problems is beneficial.

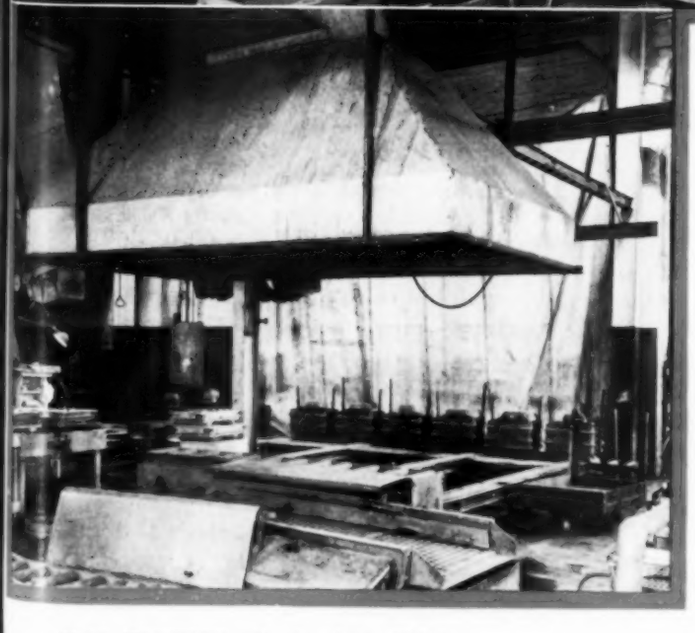
In 1935 the division of occupational disease prevention of the state department of labor and industry of Pennsylvania was asked to come into that plant and conduct a series of tests for dust, lead, mercury, zinc and other fumes so that the problem could be attacked intelligently. Even at that time conditions were favorable compared to some others, but the need of that move was recognized for the protection of employers and employes. The department of labor co-operated to the fullest extent. A chemist from the department spent 10 days in the plant and showed a definite desire to be of help. The plant benefited, the department learned more about industrial problems and the result was a better understanding in general. Following the series of tests an exhaustive investigation was conducted in the foundry and in outside foundries for several months. Results of the ideas accumulated over that period are shown in the new layout and methods.

Fig. 1—(Above)—Metal is carried to molds on monorail hoist for pouring. Fig. 2—(Upper Right)—Air from outside comes through floor grille and carries fumes to three exhausts located in the wall. Fig. 3—(Right Center)—Molds are carried on conveyors from molding stations for pouring and shakeout. Fig. 4—(Right)—Mechanical shaker and hood. Men stand at the ends

Handling material not only is costly but causes more accidents than any other single factor. With the new setup more material per man is handled. Lifting and back aches are reduced to a minimum. Foot injuries, hand injuries, heavy labor, back bending while pouring, etc., practically are eliminated. A gravity roller conveyor, 12 inches above the floor, makes it more comfortable for the pourers. They do not have to bend so much and the chance of spilling is reduced.

Melting furnaces were moved and separated from





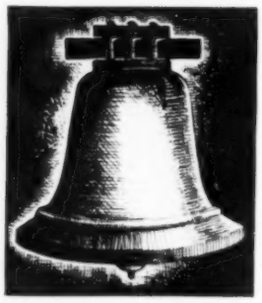
the foundry proper by a complete enclosure. Three exhausts are located at the top of the melting room and remove 50,000 cubic feet of dust laden air per minute. The dust contains zinc and other metal fumes, combustible oxygen, and carbon monoxide gases from the furnaces and smoke from other impurities. Men do not suffer from fume fever or chills. Pouring is done at the sides at two designated points instead of every where as formerly.

Castings are shaken out at one station where the air and dust are drawn away through an exhaust system. Velocity below the hood at the worker's breathing zone is 250 feet per minute and the air movement at the throat of the hood is 14,000 cubic feet per minute. One half the required amount of moisture is added to the sand before the molds reach the shakeout. This helps reduce the amount of dust. Exhaust from the shakeout is connected to a dust collector located outside the building and this arrangement prevents recirculation of the dust. Efficiency of the molders is improved. Under the new arrangement one man dumps the molds, one man removes the castings and a third man handles the empty flasks.

Exposure to the dusty part of foundry work is reduced to 30 per cent of the former normal amount. The men take turns at the shakeout and this further reduces the exposure. The (*Please turn to page* 74)

This article is from Safe Practice bulletin, No. 15, published by the department of labor and industry, Commonwealth of Pennsylvania. The discussion is reproduced through the courtesy of Lewis G. Hines, secretary and Frank K. Boal, deputy secretary of the department, the General Electric Co., and the author. The Editors

MANY NONFERROUS ALLOYS AVAILABLE



By N. K. B. PATCH

IN THE series of alloys appearing on pages 84 and 86 of the March issue is included compositions known commonly as bell metals. Some of these specifications permit the presence of fractional percentages of zinc or phosphorus or both, but these are not desirable if the material is to be used for the production of the best toned bells. The purer the raw metals used in the production of bell metal, the truer and sweeter will be the tone of the resulting bell. There have been those who have claimed to improve the copper-tin bell metals, such as 80 per cent coppeer, 20 per cent tin, or 83 per cent copper, 17 per cent tin, by addition of small percentages of silver, but there is little evidence in the published data to prove the success of that addition to an already accepted alloy for the purpose.

Pure Metals Required for Bells

The finest bells in the finest carillons throughout the world are those cast from the purest copper plus the purest of tin, properly alloyed so that the proportion of copper and tin is uniform throughout the entire bell and the presence of oxides or drosses has been overcome entirely. Of course, the shape of the bell influences the tone and size influences both pitch and tone. Production of the best bells is an art developed to a nice scientific process by those who specialize in the production of those musical instruments.

Bell metal is essentially brittle since the copper-tin ratio necessarily would produce so much of the secondary or delta constituent as to decrease elongation materially, but it does contain a large amount of the hard or bearing crystal. Therefore, it has the ability to resist abrasion or wear much more than those alloys in which the delta constituent is not of so large a proportion. For that reason, those compositions, such as *MM* and *NN* are used frequently for bearings under heavy duty, such as bridge turntable bearings, and bushings for bascule bridges. Of course, it is to be noted that all such bearings must have the right kind of hard steel to mate with a bearing material in which the hard constituent is so prominent, and the lubrication must be well maintained if the best results are to be secured.

In the series *PP* to *ZZ* (THE FOUNDRY for March, page 84) we have the copper-tin bronzes with appreciable additions of lead, and in many instances of both lead and zinc, or lead and phosphorus. Lead tends to improve the machinability and according to many authorities improves the wear resisting capacity, since lead sometimes is considered a sort of lubricant. It reduces elongation as indicated by the physical properties for these compositions when compared with straight copper-tins of similar ratios.

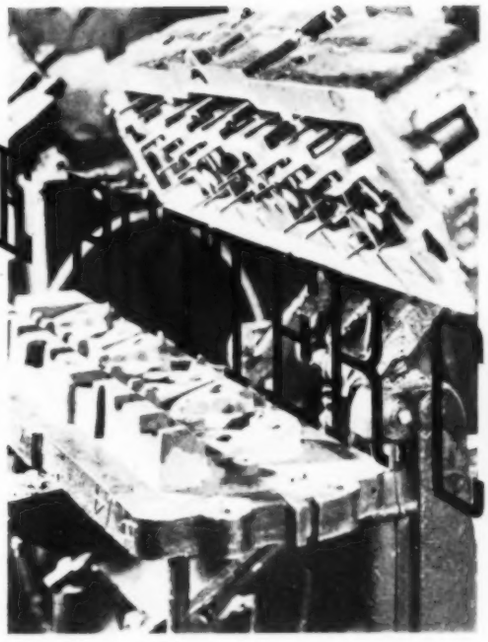
Hardness is affected and the ultimate tensile strength falls off, as will be noted by reference to the table for those compositions (THE FOUNDRY for March, page 86). Lead is present as free lead in small globules distributed throughout the mass. Lead does not combine or form an alloy with any of the other ingredients in any large proportion. As a result the lead globules, which are not very strong, form spots in the casting where the strength is only that of the strength of the lead. Addition of zinc tends to harden the alloys somewhat.

Zinc Acts as Deoxidizing Agent

It increases the ultimate tensile strength slightly, thus compensating to some extent for the reduction in tensile strength, which is to be expected from the addition of the previously mentioned lead. Zinc acts as a deoxidizing agent in those compositions, thus reducing the tendency toward oxides that might otherwise effect the quality of the physical properties of the composition adversely.

In the composition *YY* one per cent nickel is included and it is sometimes found in small percentages in some of the other compositions. Nickel tends to refine the grain and thus to increase (*Please turn to page* 77)

WHY NOT MAKE BETTER CORES?



By L. P. ROBINSON
Werner G. Smith Co.,
Cleveland

SOME 20 years of close contact with the core rooms of America has indicated, among other things, that failure to produce good cores generally can be attributed to one or more of nine fundamental factors. Obviously it would be impossible within the scope of this article to do more than touch upon these fundamental causes. A brief reference to each item may serve to point out some inherent defects in core room operation.

While it is a fact that cores can be made from practically any sand, there is always one best kind of sand for any particular core and any particular metal, gray iron, steel, malleable or nonferrous. Through locality or cost the ideal sand is not always available. However, each section of the country has some sands superior to others and the cost is not prohibitive. When used in the proper ratios with binders, these sands can and do produce commercial cores.

Generally speaking, core sand should be chosen on the following basis: *A*—Sand must be reasonably clean. An excess of clay content or fines forces the coremaker to use too much oil to produce a strong core with sharp edges. Too much oil generates an excess amount of gas. If this gas is not driven out of the core during baking, it surely will increase the possibilities of blows in pouring. *B*—Sand must be uniform in grain size and it should be remembered that the smaller the grains, the more oil required to cover the larger surface area. Angular or subangular shape grains are preferable to round grain. *C*—Sand must be open enough to allow free passage of gas. This factor is controlled largely by the two preceding points. *D*—Sand must be refractory enough to withstand the action of metal. Different metals vary to a considerable extent in their effect on cores and that always must be considered.

Many types and kinds of binders are available and most of them may be said to have some value within rather strict limitations. A book could be written on a comparison of these binders. Since the advent of the internal combustion engine and the resulting necessity for production of highly intricate cores, it has been recognized generally that core oils are preferable to any other type of core binders. While there are some exceptions to the rule, it safely may be said that any core, not too large to be baked over night, should be made in oil sand.

In selecting an oil, care should be taken to choose one which will give: *A*—Free workability in the core boxes, since modern foundry practice usually puts a piece price on the production of cores. *B*—Reasonably quick baking to save fuel costs and permit of a maximum number of cycles through the ovens. *C*—Maximum binding strength. It is well known that the less oil used in a core, providing it is a commercial core, the better will be results in core oven, molds and cleaning room.

While on the subject of binders, it may be appropriate to touch briefly on cereal binders. There seems to be a tremendous amount of misinformation on their place and use. No foundry should keep house without cereal binders. They serve a distinct purpose in supplying green bond partciularly in core blowing machines. However, the common tendency is to use too much cereal binder. A safe plan is to use just sufficient to give (*Please turn to page* 80)

This article is from a paper which was presented by the author before a number of chapters, local foundry associations and regional conference during the past year— The Editors.

QUESTIONS AND ANSWERS

Drossy Spot in Brass Casting Is Caused by Gas or Steam

We are forwarding for your inspection a small brass valve body broken at a leaky area. We shall appreciate your opinion on the probable cause of this defect.

The drossy spot in the casting submitted was caused by gas or steam, not enough to show all over the casting, but enough to saturate a small amount of metal. This affected portion of metal was carried a certain distance until the constantly lowering temperature caused it to stop at the point where it showed up later when the test was applied. The steam may have been generated through any one of several causes, for example a hard spot or extra damp spot in the mold or core.

Basing an opinion on general experience we are inclined to the opinion that the swab was applied carelessly to the sand in the mold or in the gate or runner. Long distance diagnosing, for lack of close and intimate detail, is liable to error, but our general impression is that there is a certain amount of laxity on the part of the operator who made the casting. General technique in every feature, molding, coremaking and pouring should be checked by a competent observer and if necessary, tightened up all around.

Desires Information on Making Small Gray Iron Skillets

We are contemplating production of small cast iron skillets 7 inches diameter and ⅛-inch thick. We shall appreciate information on the following points: 1—Proper amount of pig iron and scrap in cupola charge. 2—Analysis of iron in casting. 3—Can these castings be made in permanent molds? 4—Is there any more economical method than the usual sand mold for producing these castings in large numbers? 5—What kind of molding sand is required to produce smooth castings?

Taking your questions in the order, the usual cupola charge for light castings is 40 per cent pig iron and 60 per cent scrap. However, this reply must be qualified by the statement that the pig iron and scrap must be of a character to yield the following approximate analysis in the casting: Silicon 2.75 per cent; sulphur under 0.10 per cent; phosphorus 0.80 per cent; manganese 0.50-0.60 per cent.

The castings can be made in permanent molds, but here again a qualifying clause is in order.

A careful analysis is needed to determine whether the capital expenditure for molds and annealing furnaces can be absorbed in a reasonable period to show a profit over the usual sand method of making the molds. Information on this subject can be secured from the manufacturers of permanent molds.

A fine grain sand is required to impart a smooth surface to the castings. Sand of this kind is available practically in all sections of the country. Certain characteristics are more pronounced in some than in others, but in a general way the sand for making smooth surface thin castings conforms to the following A.F.A. standards: Fineness 100 to 150; clay content 10 to 20 per cent; permeability 20 to 50; green bond tensile strength 4 to 9 ounces; green bond compression 8 pounds; moisture content 4 to 6 per cent.

Careful Venting of Drag Mold Will Permit Gas Escape

We are forwarding a piece cut from a large dome which resembles a bath tub. The casting is 90½ inches long, 19⅝ inches high and 34½ inches wide with a metal thickness of about ¼ inch. The casting is made dome up, gated from the bottom with a series of finger gates all along the four edges, and wedge risers are equally spaced along the top. We are experiencing trouble with gas pockets in the area around these risers and the gas pockets can only be detected after cleaning and applying a hammer test.

Examination of the specimen shows a gas pocket over 2 inches long, and approximately ¾-inch wide, covered on both upper and lower face with a skin of metal about 1/16-inch thick. There is no doubt in our mind but that the defect is simply a gas pocket resulting from the inability of that gas to escape from the mold. Due to the large body of sand in the drag, it is essential that proper provision be made for venting. In the early days of bathtub molding

that was accomplished by placing the molding sand in comparatively thin courses and tramping them off.

Ramming was only permitted on that part of the mold which later formed the joint, and just before the surplus sand was scraped off for the bottom boards. At present a special flask is employed which forms a mold with a hollow interior. Since you probably do not wish to go to the expense of making such a special flask, other means of venting must be employed.

Probably the easiest way to provide proper vents would be to place about 4 or 5 inches of sand in the drag pattern and then stand a row of wooden plugs about 6 inches in diameter along the center line. We should judge that five or six plugs will be sufficient and the plugs should be long enough to reach from the previously mentioned layer of sand to the portion of the flask or mold which rests on the bottom boards. If a perforated board is not employed, then a sufficient number of vents should be cut from the plugs to the sides of the flask to insure that the gas can escape readily. After the mold is filled with sand, the plugs are removed.

We note that you are using six wedge risers at the top of the casting and it is our opinion that they are of little value. We believe that you will get just as good results without them provided your sand is vented properly. Taking another lead from the bathtub molding practice, we wonder if you have ever tried pouring your casting through a top gate instead of your present practice from the bottom.

You can realize of course that it is much simpler to do it that way. You could build a long basin over your present row of wedge risers, and pour the metal into the basin. However, use of top gates of that kind means that the sand must be rammed harder in that portion to prevent cutting by the molten metal. Harder ramming means less permeability, and the likelihood of your present trouble, gas pockets. Therefore, your present method of gating from the bottom will serve best since it permits softer ramming.

Gas Is Absorbed by the Metal During Melting Process

We would appreciate information on a problem which basically is one of gas. Samples of the defect are being mailed to you. The defect varies considerably from a low minimum up to 2 and 3 per cent, and occurs mainly on sink fixtures with spasmodic appearances in other parts. Metal is melted in an electric furnace and poured at 2240 degrees Fahr. as soon as ready. The defect looks like a blow of some kind, and occurs on the highest part of the casting. However, the hole is bright and clean inside. We also are having difficulty in that the sand used in our core blower seems to air dry, and the dry material clogs the machine parts.

Examination of the several samples confirm your opinion that the holes in the castings are caused by gas. It is our opinion that the gas is absorbed by the metal during melting, and therefore the problem is to determine what variations in melting practice are responsible for the fluctuations. By close attention to melting detail, you can eliminate trouble from gas absorption which is termed "pinholing," or incipient porosity. That is accomplished by melting in a neutral atmosphere, or since that type of atmosphere is rather difficult to attain, to melt in a slightly oxidizing atmosphere.

In one instance difficulty from gas absorption was eliminated by injecting a small amount of compressed air into the electric furnace. While you do not mention the raw materials used, presumably you are using a certain amount of borings and turnings from your machine shop for a portion of the charge. Since those contain oil, they tend to produce a strongly reducing atmosphere in the furnace, and we believe that it will be well worth your while to dry those borings and turnings at a temperature high enough to burn off the oil before use.

Your trouble in core blowing may be due to the ingredients in the mixture, that is to say the amount of each used, and since you do not state the proportions, we can only offer suggestions and mixtures that are being used successfully. One for cores baked in dryers, or for which no great amount of green strength is required, is made up of 150 quarts of sharp sand, 3 quarts of core oil, and 3 to 4½ quarts of dry binder. Another for intricate cores requiring considerable green and dry strength contains 150 quarts of sharp sand, 3½ quarts of core oil, and 3 to 6 quarts of dry binder.

Hard Core in Boiler Casting Causes Trouble in Removal

We shall appreciate your opinion on a good core sand mixture for the body core of a boiler section. These sections show an average thickness of ¼-inch and vary in weight from 200 to 950 pounds. The core sand mixture we are using does not break down and we experience considerable trouble in removing the sand from the casting.

Several reasons may be responsible for or possibly contributory to the hard cores in the boiler section castings. The most probable cause is an excessive amount of oil in the mixture. In many foundries specializing in that type of casting the ratio of oil to sand may be as high as 1 part oil to 80 parts sand. The cores are sufficiently strong to withstand the usual handling outside, and the metal pressure inside the mold. In the cleaning room the castings are rapped with a hammer or vibrator and the sand runs out readily through the small openings. Only a clean sharp sand will act in that manner.

If the amount of oil is excessive or if the addition of bank sand to the mixture introduces a certain amount of clay, the core will not disintegrate readily. Method of baking the cores may be a contributory factor. In some instances the top of the core is baked satisfactorily, but the bottom in contact with the core plate does not reach that condition. Heat from the metal finishes the baking process, but is dissipated before the core begins to disintegrate. Briefly the cores must be made from a clean sharp sand bonded with a minimum amount of oil and dried thoroughly at a temperature between 350 and 400 degrees Fahr.

Adding Silicon to Aluminum Alloy

Can you give us information on the proper method of adding silicon to aluminum? The mixture we wish to use contains 2.5 per cent silicon, 6.5 per cent zinc, 5.5 per cent copper and 85.5 per cent aluminum.

There are a number of ways in which your aluminum alloy may be formed and the particular one selected will depend of course upon the raw materials available. For example it could be made from 68.75 pounds of regular No. 12 containing 8 per cent copper and 92 per cent aluminum, 5 pounds of 50-50 aluminum-silicon alloy, 19.75 pounds of pure aluminum and 7 pounds of pure zinc. Another mixture would be 68.75 pounds of regular No. 12, 25 pounds of a 10 per cent silicon-aluminum alloy and 7 pounds of pure zinc. A third mixture could be composed of 68.75 pounds of regular No. 12, 20 pounds of a 12½ per cent silicon-aluminum alloy, 4.75 pounds of pure aluminum and 7 pounds of pure zinc.

In all cases mentioned the No. 12 aluminum alloy of course, supplies the copper, the silicon is supplied by any of the several mentioned silicon-aluminum alloys, and the zinc is supplied by use of pure zinc. Due to possible loss of zinc through volatization, an additional ½ per cent above that actually required has been included. In all cases, all materials except the zinc are melted together, and the zinc is added just a short time before pouring to prevent as much as possible any loss of zinc.

Want To Make Large Chemical Pots

We are interested in knowing the analysis of cast iron which would be suitable for the large pots used in the production of sodium hydroxide (caustic soda). We would like to know the molding methods, etc., for producing these pots.

Experienced molders could make a satisfactory pot casting with a pair of sweeps, a crab and a cover plate. By providing a full pattern, a corebox and an accurately fitting flask, a satisfactory casting could be turned out by a gang of laborers equipped with air rammers. The number of castings ordered usually is the deciding factor in determining the most suitable molding method to adopt. Several ingenious methods have been developed in plants where these castings are made continuously, but the rigging in each case is rather elaborate and the cost renders it entirely prohibitive if only a single casting is required.

Castings are made in some foundries with the bottom of the pot in the position it will occupy when in use. In other foundries the pot is cast in an inverted position. Both plans have their advantages and disadvantages. Following is a brief outline of several methods:

1. The outside of the mold is swept in a pit with a single runner built of tiles or cores from a point near the bottom to the joint. The core is built on a plate, dried in that position, then rolled over and lowered into the mold in the pit. The advantage of this method is that no flasks are required. The disadvantage is that the core is an awkward job to roll over.

2. Outside of the mold is swept as in the first plan. The core is swept over a number of cast iron or steel segments erected on a circular plate and bolted together to form a shell conforming to the shape of the inside of the pot. Two and sometimes four of the segments are bolted to those adjoining through long slots. After the casting is poured, the top ring is removed. The crane then is attached to the two or four special segments and they are pulled to the limit of the slots. This treatment permits the casting to contract.

3 The drag is swept in a pit. Core is rammed in sand in a manner that eliminates the necessity of rolling it over. Where only one casting is required the core may be rammed directly in the drag plus a thickness of sand corresponding to the thickness of metal. After the core is lifted out this thickness of sand is removed from the face of the drag. However, where many castings are ordered a permanent mold is swept in concrete to serve as a corebox. One arbor is placed on the bottom and rammed full of sand. Additional ring arbors are built on top and bolted to each other. The arbors are provided with chuck bars so that only about 6 inches of sand is rammed against the face of the corebox all the way up. The top of the core is covered by a large cope to which the arbor is fastened by long bolts. In one plant a number of segment cores take the place of the arbors and green sand. The cores are assembled inside a form, bolted together and then bolted to a cope that is lowered down on them. This method does away with the necessity of drying the core as a whole.

4. In one or two places the pot is molded bottom side up and a large riser is placed on the top. This involves the use of an immense flask. A whole pattern is employed with the top loose. The inside of the pattern is rammed full of sand. Then the outside flask comprising the cheek and cope is rammed full of sand and taken away. The pattern is removed and after the mold is dried the two parts are reassembled and the casting is poured.

The various methods mentioned are those used for producing pots in sand molds. However, if it is desired to use loam molds, the procedure is different as might be expected. A suitable composition for caustic pots contains about 0.70 per cent silicon; 0.50 per cent manganese; 3.30 per cent total carbon; 0.60 per cent chromium, and 1.50 per cent nickel. To obtain the low total carbon from 30 to 50 per cent steel scrap should be used in the metal charge.

Melts Gray Iron in Electric Furnace

Does the use of basic melting practice on an electric furnace melting gray iron have any beneficial effects on the strength and machinability of the iron? We have been melting iron for special and jobbing castings, in an acid electric furnace, and have been considering the advisability of changing over to basic if the strength and machinability would offset the additional cost. Pouring our iron at high temperatures has seemed to have a detrimental effect on the machinability with a consistently higher hardness for approximately the same analysis. Converting all steel charges to iron in the furnace by the addition of petroleum coke, has given us excellent material with high strengths, but the furnace time and power consumption make the cost too high. We aim to get a combined carbon in the 0.90 to 1.00 per cent range, as much of our product is heat treated and this particular range seems to give the best results for the purpose. To get this combined carbon, it is necessary to run 3.30 to 3.40 per cent in total carbon, and as the resulting graphitic carbon tends to a so-called open structure after quenching, we would appreciate any suggestions. We use 0.30 per cent molybdenum in our iron.

Changing from acid melting of gray iron to the basic practice, we do not believe, will provide any betterment of strength and machinability when using all steel charges. It is our impression that use of the basic furnace with gray iron is similar to that in the case of steel, in that the refining possibilities in that type of furnace permit elimination of certain elements, sulphur and phosphorus particularly, which might be detrimental in cases of specific castings.

We wonder if your difficulty lies in using too-high superheats in the melting of your iron. Di Guilio and White carried on some experimental work at the University of Michigan and they found that melting

gray iron in the electric furnace at temperatures above 3035 degrees Fahr. caused sudden increase in hardness and decrease in physical properties. The iron was poured at 2700 degrees Fahr. Complete data on their work is contained in the *Transactions* of the A.F.A., Vol. XLIII, 1935. Incidentally, the same trouble has been observed by a number of investigators using high superheats on various compositions. The net results seem to be that in the case of a poor raw material, superheating exerts an extremely beneficial effect. However. in the case of a good raw material, care must be exerted so as not to exceed a critical point which is somewhat around that mentioned by Di Guilio and White.

We notice that you state you are running your total carbon from 3.30 to 3.40 per cent which seems rather high to us since the use of the electric furnace generally is made to obtain reasonably low total carbon, say, around 3 per cent. It is our impression that melting down straight steel charges with a sufficient amount of carbonaceous material in the case of the acid furnace, results in a bath containing from 2.50 to 2.75 per cent carbon after melting down. Increasing the carbon from that point on usually is the result of a time and temperature combination. Consequently, it is much easier to increase the carbon to 3 per cent than it is to raise it to 3.30 or 3.40 per cent.

Low carbon irons of course are more difficult to handle in the foundry since they begin to freeze at considerably higher temperatures than in the case of higher carbon irons. However, by increasing the silicon content of those irons much of that difficulty is eliminated. Incidentally, effect of silicon in the case of low carbon irons is much less pronounced than in the case of the higher carbon iron.

It appears to us also that if the iron is subjected to a heat treatment including quenching and drawing that much better results would be obtained with the lower carbon iron. However, at this point another thought comes up and that is whether you are trying to make one type of iron answer for two purposes. That is to say, produce a gray iron which is machinable without any treatment in the case of some castings, and use the same iron with some type of heat treatment for other castings. If that is the case, we believe it would be a mistake as it usually ends in difficulty with one or the other condition you are trying to meet. It is much more preferable to make two different types of iron designed specifically for the application you have in mind.

Casting Fracture May Be Cold Shut

We are sending for your inspection a section of a bronze casting which contains 88 per cent copper, 8 per cent tin and 4 per cent zinc which contains a break. We would like to know if it is a hot or cold break, or the result of two streams of metal not joining properly.

Since the specimens which reached us showed signs of having been rubbed together, we cannot be positive that the break or fracture was a cold shut, but it definitely does seem to be the result of the meeting of two streams of metal which did not knit completely. Cold shuts in the particular alloy are not infrequent, and they can be corrected by changing the gating or, inclining the mold and pouring through several entrances.

Frequently an increase in size of the gate or increase in pouring speed will correct the difficulty you now are experiencing, without any change in gating or position of the mold.

Melts Small Amount Of Copper Alloys

We are looking for information regarding the casting of bronze and similar nonferrous metals, particularly manganese bronze. We would like formulas for bronze and directions for mixing the ingredients, and also the construction of the furnace and other parts of the foundry. We have been thinking of using a kerosene burner similar to a plumbers torch that gives considerable heat with the casting under pressure. We only want to melt a small amount of metal, say 25 pounds, at one time. Do you think this type of burner is satisfactory?

Your request for information on the production of nonferrous castings covers too wide a field to be answered with any detail, and consequently only various points can be touched upon briefly. As far as we are aware, there is no book available which will give you all the information you desire. Compositions of a number of standard nonferrous alloys have been presented in a number of recent issues of THE FOUNDRY, and are given in the *Cast Metals Handbook* published by A.F.A. That book deals only with the physical properties and metallurgical phases and does not cover molding.

Gating of a wide variety of nonferrous castings is described in detail in a book entitled *Gates and Risers for Castings*, by Pat Dwyer. However, there is little available on the subject of molding as related to nonferrous castings in book form. Numerous articles describing the molding of specific nonferrous castings have appeared in THE FOUNDRY from time to time and we suggest that you look through the back issues for the necessary information.

While we cannot state definitely, we do not believe that the kerosene burner you have in mind will prove satisfactory unless in addition to having the kerosene under pressure, you also have the air under at least a few ounces of pressure. For melting the small amount of metal you have in mind, we believe that an ordinary blacksmith forge fire will give you good results.

Make Soft Castings By Mixing Gray Scrap

What is the best or most convenient method of alloying gray iron scrap in a small melting medium to produce soft castings in weight from 1 to 3 pounds?

Thickness of section in the casting affects the composition considerably so that an iron of a definite composition which might be soft and machinable in a section 1-inch thick when poured into a casting ⅛-inch thick would be too hard to machine. Gray iron scrap varies widely in composition and therefore, before attempting to alloy it for any purpose, the original composition must be known. In addition to the foregoing factors the melting medium must be taken into consideration. Silicon is the active element in controlling the hardness of iron. A charge of material melted in the cupola will lose approximately 25 points of silicon in the melting process. In the electric furnace it is less and in a crucible it is practically nil.

In a general way your question may be answered as follows: Assuming that your castings are from ⅛ to ¼-inch thick the iron will need to have a silicon content of 2.50 per cent. Approximate silicon content of automotive scrap is 2.20 per cent, machinery scrap 2.00 per cent and stoveplate scrap 2.50 per cent. Remelted in the cupola the resulting iron will show 1.95, 1.75 and 2.25 per cent respectively. The usual method of raising the silicon content is by the addition of ferrosilicon or of pig iron containing a high percentage of silicon. In your case and assuming that you are melting the iron in a crucible, lump ferrosilicon may be added to the charge, or powdered ferrosilicon may be added to the metal in the ladle. The exact amount must be determined by experiment. Addition of small amounts of nickel from 0.50 to 1.0 per cent also will be beneficial in producing an iron which possesses excellent machinability.

MEN of INDUSTRY

W. H. SPENCER, for several years foundry superintendent and metallurgist, Sealed Power Corp., Muskegon, Mich., recently was made foundry manager of the Wilkening Mfg. Co., Philadelphia, piston ring manufacturer. Mr. Spencer was born in Thomasville, Ala., and received his early education in the schools of Alabama and Canada. His technical training was obtained at Vanderbilt university, Nashville, Tenn., where he received his bachelor of science degree in 1926. After graduation he joined the staff of the American Cast Iron Pipe Co., Birmingham, Ala., and with the exception of the year 1928-39 when he was foundry superintendent at the University of Illinois, he was with the American Cast Iron Pipe Co. until he became connected with the Sealed Power Corp. Mr. Spencer is well known in the foundry industry for his many papers on different phases of cast iron and cupola practices and his articles in the technical press.

♦ ♦ ♦

C. J. BUNTING recently has become connected with the Pittsburgh Valve & Fittings division, Pitcairn Co., Barberton, O. as metallurgist. Mr. Bunting first became connected with the foundry industry as metallurgist with the Danville Malleable Iron Co., Danville, Ill., in 1920. In 1932 he left that company to accept a similar position with the Decatur Malleable Iron Co., Decatur, Ill. The period from 1933 to 1935 he was in charge of furnaces and laboratories at the Ironton, O., plant of the Dayton Malleable Iron Co., leaving there to reorganize the metallurgical practice of the Southern Malleable Iron Co., East St. Louis, Ill. He became superintendent of the Mal-Gray Castings Co., Cambridge and Middletown, O. after leaving the Southern Malleable company.

♦ ♦ ♦

C. C. DRAKE recently was made superintendent of the Denver, Colo., plant of the Griffin Wheel Co. succeeding THOMAS FITZSIMMONS, who has retired. Mr. Drake was born in Breckenridge, Colo., in 1891 and was graduated from the Denver high school. After working in a number of mining towns of Colorado and Nevada, he was employed as a laboratory assistant for the Schultz Drug Co., Denver. In 1916 he was made storekeeper of the Griffin Wheel Co., Denver. After about 5 years, during which time he was occupied with clerical work in the office, he was transferred for a short time to the Los Angeles plant of the Griffin company. The following year he was made office manager at Denver. Mr. Drake's education has been supplemented by extension courses and an intense interest in lectures on manufacturing problems.

♦ ♦ ♦

F. J. HEAD, recently was made superintendent of the Chicago plant of the Griffin Wheel Co. Mr. Head has been connected with the Griffin company since 1905, filling every position, both in the office and operating departments at the St. Paul and Council Bluffs, Iowa plants before being transferred to Chicago. He first became connected with the company at St. Paul as chief clerk and then was transferred to Council Bluffs plant in 1920 as cashier. He was made superintendent of that plant in 1922 and served in that capacity until 1930 when he was returned to St. Paul as superintendent. His early education was at the Christian Brothers school, St. Paul.

♦ ♦ ♦

J. H. CRAWLEY, foundry superintendent since 1936, Pontiac Motor division, General Motors Corp., Pontiac, Mich. has resigned. Mr. Craw-

(*Concluded on page* 40)

C. J. Bunting

C. C. Drake

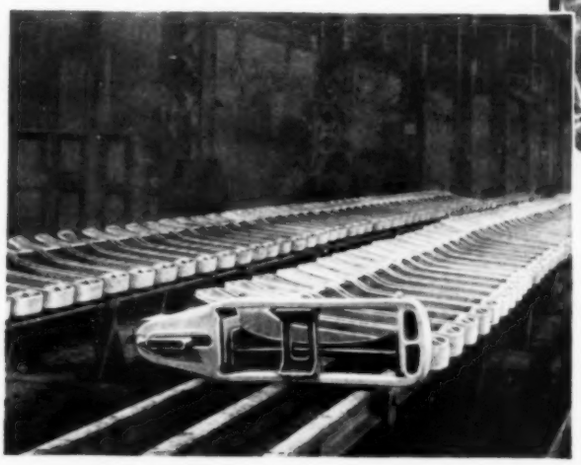
W. H. Spencer

F. J. Head

So little NICKEL makes these BIG IMPROVEMENTS

CAST IRON + 2.00% Nickel for INCREASED TOUGHNESS. 12-foot barking drum gears used in pulp and paper mills are subjected to wear and severe stresses. The Carthage Foundry & Machine Co., Carthage, N. Y., casts both gears and pinions from a Nickel alloyed iron of high machinable hardness and increased strength and toughness. With a 50% steel mixture the composition used for these gears is: T.C. 3.20%, Si 1.20%, Mn 0.90%, Ni 2.00%, and Cr 0.35%.

CAST STEEL + 1.25% Nickel for STRENGTH. Dead weight has long been a problem in the design of railroad rolling stock—particularly freight cars. To cut down excess weight and still secure sufficiently high strength and toughness to resist stresses to which freight car trucks are subjected in service, the Buckeye Steel Castings Co., Columbus, Ohio, cast these yokes, as well as side frames and bolsters, of a Nickel-manganese steel. Tests showed a tensile strength of 95,000 p.s.i. The composition is: C 0.28%, Mn 1.50%, Ni 1.25%, and Si 0.35%.



BRONZE + 1.00% Nickel for PRESSURE TIGHTNESS. Motorcycle carburetor castings are small, intricate, and subject to intense vibration. They must retain tightness throughout a wide range of temperatures. To the regular 85-5-5-5 bronze mixture Langenskamp, Wheeler Brass Works, Inc. of Indianapolis, adds 1% Nickel to assure uniform density and freedom from porosity. Nickel also aids machinability and reduces scrap losses. Your inquiries regarding uses of Nickel in irons, steels and non-ferrous alloys are always welcome.

THE INTERNATIONAL NICKEL COMPANY, INC., 67 WALL ST., NEW YORK, N. Y.

(*Concluded from page 38*)

ley is a former chairman of the Detroit chapter of the American Foundrymen's Association. He has been succeeded by Omer L. Allen, for 24 years associated with Wilson Foundry & Machine Co., Pontiac, latterly as general superintendent. Mr. Allen in early years was associated with Rutenberg Motor Works, Logansport, Ind., and prior to going with Wilson was general foreman at the Maxwell foundry in Dayton, O.

♦ ♦ ♦

CARL HORSTKOTTE, superintendent Central Pattern & Foundry Co., Chicago, for the past 8 years, recently has been appointed foundry superintendent of the Badger Brass Foundry Co., Milwaukee. Before his Chicago connection Mr. Horstkotte for a period of 5 years was superintendent of the National Aluminum Foundry Co., Peoria, Ill.

♦ ♦ ♦

ALBERT G. ZIMA, western representative, development and research division, International Nickel Co., Los Angeles, recently was made chairman of the Southern California chapter of the A.F.A. Mr. Zima was born in Plymouth, Iowa, educated in the public schools of Mason City, Iowa, and in 1924 received his degree in chemical engineering from the University of Minnesota. During the war he was in the U. S. Marine corps and spent 22 months overseas. Mr. Zima was connected with the Anaconda Copper Mining Co., Anaconda, Mont., during 1916 and 1917. Following graduation he became metallurgist, Western Crucible Steel Casting Co., Minneapolis, and remained there until 1930 when he became connected with the development and research department, International Nickel Co., New York He was made western representative of the development and research division in 1936. Mr. Zima is a member of the American Foundrymen's association, American Petroleum institute, and vice chairman of the Los Angeles chapter, American Society for Metals. He is the author of a number of papers presented before technical associations.

♦ ♦ ♦

RICHARD P. BROWN, chairman of the board, Brown Instrument Co., Philadelphia and vice president of the Minneapolis-Honeywell Regulator Co., Minneapolis, has been appointed by Arthur H. James, governor of Pennsylvania to be the first secretary of the newly created department of commerce for that state.

♦ ♦ ♦

A. C. GELDNER has been made district sales manager at Los Angeles for Republic Steel Corp. Mr. Geldner joined the Union Drawn Steel Co. as a salesman in its Cleveland office in 1920. He continued in that capacity until 1928 when he was made Cleveland district sales manager. In 1932 he joined the staff at the Los Angeles office and in 1934 was made district sales manager for the Pacific coast, which position he held until early 1939 when he was appointed assistant district sales manager for Republic Steel Corp. in Los Angeles.

♦ ♦ ♦

GEORGE CLARK, for 4 years metallurgist with Kelsey-Hayes Wheel Co., Detroit, is now associated with Steel Sales Corp., Detroit.

♦ ♦ ♦

DR. EMIL OTT recently was appointed director of research, Hercules Powder Co., Wilmington, Del.

♦ ♦ ♦

K. I. GANNON recently was appointed to the sales staff of Charles Taylor Sons Co., Cincinnati, in the St. Louis office.

♦ ♦ ♦

IVAN REITLER, retired president of Federated Metals division, American Smelting & Refining Co., recently was elected president of the Metal Reduction Corp., Dell avenue and Doremus place, North Bergen, N. J

♦ ♦ ♦

G. C. CREUSERE, for 3½ years metallurgist, Kelsey-Hayes Wheel Co. Detroit, is now associated with Semet-Solvay Co., Detroit, in a sales engineering capacity.

♦ ♦ ♦

J. B. NORDHOLDT, formerly an executive of the Toledo Steel Casting Co., and Logan Gear Co., Toledo, O., has become connected with Webster Mfg. Inc., Tiffin, O., as general manager.

♦ ♦ ♦

EARL B. CUTTER, for 34 years salesman in the Middle West for Norton Co., Worcester, Mass., retired Aug. 1. EARL C. WILLEY, of the Chicago office of the Norton Co. has been transferred to Davenport, Iowa, to succeed Mr. Cutter.

♦ ♦ ♦

A. E. DOMVILLE recently retired as superintendent of the Griffin Wheel Co. foundry at Sacramento square, Chicago, after serving 55 years in the manufacture of chilled iron car wheels. In addition to supervising a number of car wheel foundries in the United States and Canada, Mr. Domville introduced the Griffin process in several European countries, where instead of calling the car wheels chilled iron, they are known as Griffin wheels. Mr. Domville can tell many interesting stories on the research work that brought about the scientific laboratory control in the chilled car wheel industry.

THOMAS FITZSIMMONS, who celebrated 50 years of service in 1936 has retired as superintendent of the Denver plant of the Griffin Wheel Co. Mr. Fitzsimmons entered the employ of the Griffin company in 1886 at Chicago and has served actively in all manufacturing branches of the industry. He has been superintendent of several of the Griffin plants.

A. G. Zima

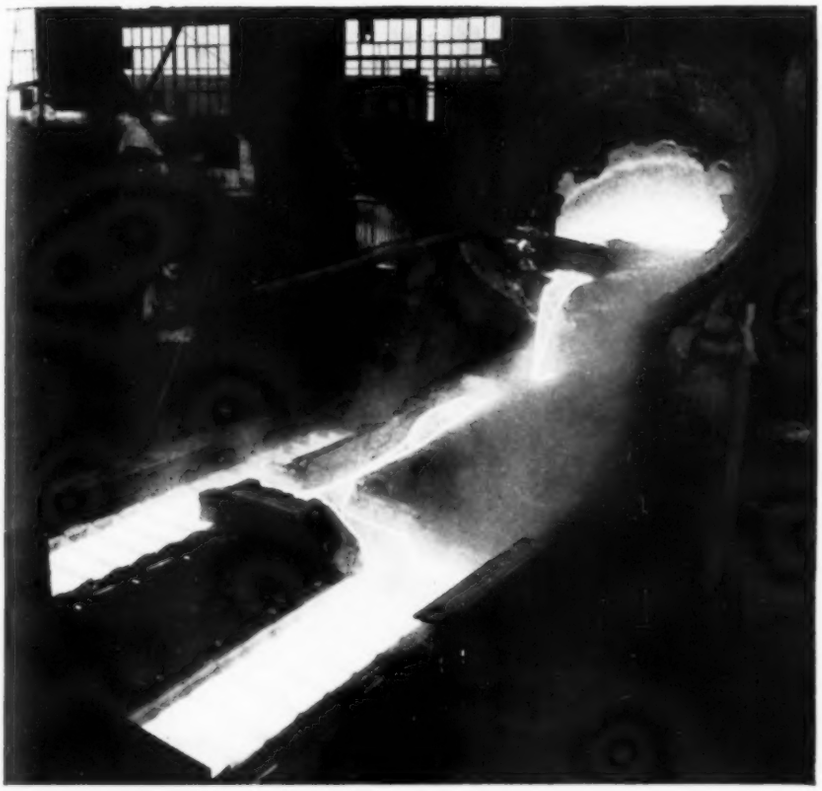
Carl Horstkotte

A. C. Geldner

R. P. Brown

WISCONSIN PIG IRON

"Better Controlled from Mine to Mold"



Left: An example of controlled methods at the Wisconsin Steel Company. At this pig machine, a skimmer block is placed on the spout of the iron ladle to hold back any kish or coke breeze lying on the surface.

Painstaking precision is an essential part of every step in producing pig iron at Wisconsin Steel Company. The quality of the finished product reflects careful control.

We place emphasis upon three points in producing our product. The first is *high quality materials.* The second is *control by men.* The third is *control by machines.* Experienced men, the finest materials, and the most modern mechanical equipment are your assurance of quality.

Our large, modern blast furnaces are capable of producing all grades of iron required by the foundry industry. Metallurgists are constantly checking and testing at every step to assure uniform, sound, fine grained pig iron. And the small Wisconsin pig has many advantages . . . it melts more rapidly and uniformly due to a large surface area and is easier and safer to handle.

You can be sure that the order you place with Wisconsin Steel will go through in accordance with your most exacting requirements. We invite users of pig iron and alloy and carbon steel to write or phone us for complete information.

WISCONSIN STEEL COMPANY
180 North Michigan Avenue Chicago, Illinois

WISCONSIN STEEL COMPANY Products

Open Hearth Alloy and Carbon Steel

•

Rounds, Flats, Squares, Bands, Skelp, Screw Steel

•

Agricultural and Special Shapes Reinforcing Bars

•

Structural Angles, Beams, and Channels

•

Universal Plates

•

Cold Drawn and Turned Shafting

•

Billets, Blooms, and Slabs

•

Pig Iron
Malleable, Foundry, Bessemer, and Basic

WISCONSIN

Alloy and Carbon Steel **Pig Iron**

ACTIVITIES OF FOUNDRY GROUPS

ANNUAL outing of the New England Foundrymen's association was held at the Pomham club, Providence, R. I., on Wednesday, Aug. 9, with nearly 100 members and guests of the association in attendance. The annual affair was in charge of the Rhode Island members of the association who are most proficient in arranging an elaborate program for the day.

Luncheon was served at noon and at 3 o'clock those present enjoyed one of Rhode Island's famous shore dinners. The foundrymen and guests made use of the club's facilities for pool, bowling, golf, soft ball, etc. Following the dinner an entertainment arranged by William G. Rich, Providence Gas Co., was enjoyed by all.—*M. A. Hosmer, reporter.*

Detroit

DEVIATING from usual summer suspension of activities, the Detroit chapter scheduled golf and dinner parties both in July and August, with a fair representation at both gatherings. On July 20, the golfers assembled at Tam-O-Shanter Country club and after a hot afternoon of murdering the little white pill, sat down to a chicken dinner with all the trimmings. Formalities were confined to introduction of several guests from Flint and Toledo, and the presentation of prizes.

So successful was this occasion that it was determined to repeat the event. Hence, on Aug. 17, the welcome sign was out at Brooklands Country club and a blistering sun greeted the foundrymen-golfers on that afternoon. The usual hefty

(*Concluded on page* 44)

Wisconsin chapter holds an outing. Photos courtesy of John Bing, A. P. Green Fire Brick Co., Milwaukee

PENOLYN DOES THE JOB!

MODERN foundry practice *demands* speed, precision and minimum waste. *Cores just have to be right!* That's why Penolyn goes over so big with foundrymen everywhere!

Of course you're sure of greater workability, minimum gas and speedier cleanout with Penolyn. But it does much more!

Foundrymen expect *and get* better and more uniform castings, with fewer rejects, by using Penolyn. They standardize their foundry operations, knowing that pouring will go on smoothly and swiftly with flawless cores...and they don't have to worry about blow-holes or cracks in finished jobs.

Penolyn makes perfect cores for perfect castings. That, briefly, is why so many foundrymen say: "Penolyn Core Oil... and nothing else!" Try Penolyn in *your* foundry and you'll say it, too!

PENOLA INC.

PITTSBURGH, PA. (Formerly Pennsylvania Lubricating Co.)

NEW YORK • CHICAGO • DETROIT • ST. LOUIS

(*Concluded from page 42*)
dinner and prizes for the ablest golfers followed. Plans for the 1939-40 series of monthly technical meetings have been drawn up and were outlined in a preliminary way to those at the meeting. Chairman H. W. Dietert and his co-workers have laid the groundwork for a highly interesting series of discussions, covering many phases of foundry operation and research.—*A. H. Allen.*

Foundry Meeting at Tool Congress

A meeting devoted to the discussion of "Castings as Engineering Material" will be held Monday, Oct. 9, at the Hotel Hollenden, Cleveland, in conjunction with the Machine Tool Congress. The meeting will be sponsored by the American Foundrymen's association, with the Northeastern Ohio chapter of the A.F.A. co-operating.

Dr. Harry A. Schwartz, National Malleable & Steel Castings Co., Cleveland, will outline the progress which has been made in the entire ferrous foundry field, and also will present data on malleable castings. James Thompson, Continental Roll & Steel Foundry Co., East Chicago, Ind., will talk on steel castings and A. C. Denison, Fulton Foundry & Machine Co., Cleveland, will discuss gray iron castings. E. F. Hess, Ohio Injector Co., Wadsworth, O., chairman of the Northeastern Ohio chapter of the A.F.A. will preside. The Northeastern Ohio chapter has scheduled that session as its regular meeting for October.

The American Society of Mechanical Engineers will hold a meeting on Thursday, Oct. 5, as a part of the Machine Tool congress, which should be of interest to foundrymen. Frank J. Dost, Sterling Foundry Co., Wellington, O., will discuss "Cast Iron for Machine Tool Frames" while Fred Volz, Lakeside Bridge & Steel Co., Milwaukee, will talk on "Welded Frames for Machine Tools". Prof. A. T. Christie, John Hopkins university, Baltimore, and president of the American Society of Mechanical Engineers, will preside.

Announce St. Louis Regional Program

Third annual regional conference of the St. Louis District chapter of the A.F.A. will be held at the Jefferson hotel, St. Louis, Oct. 5 to 7. Thursday, Oct. 5 will be devoted to registration and plant visitation, while a smoker will be held in the evening.

The annual conference dinner will be held Friday evening Oct. 6 with Lee E. Everett, chairman of the chapter, presiding, and Carl Landgrebe, Tennessee Coal, Iron & Railroad Co., Birmingham, Ala. as speaker. An excellent program of technical sessions on Friday and Saturday will cover production problems pertaining to steel, gray iron and nonferrous castings. Advance registrations indicate a large attendance.

A special invitation has been extended to technical students to partake in the plant visitation and the technical meetings.

Tentative program is as follows:

Thursday, Oct. 5

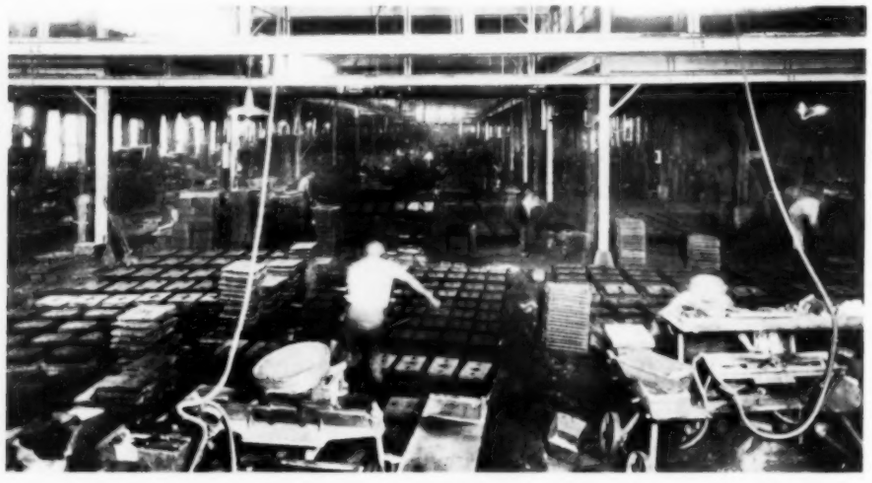
Registration, plant visitation, smoker in evening.

Friday, Oct. 6

9:15 a.m.—General Interest Joint Session, *Design as Relation to Casting Problems*
Chairman, Lester B. Shannon, Stockham Pipe & Fittings Co., Birmingham, Ala.
Steel, by A. H. Moorhead, Locomotive Finished Material Co., Atchison, Kans.
Gray Iron, by E. B. Carpenter, American Car & Foundry Co., St. Louis.
Nonferrous, by Carl O. Thieme, H Kramer & Co., Chicago.
12:00 p.m.—Luncheon
Address of welcome by Lee E. Everett chapter chairman, Key Co., East St Louis, Ill. Speaker, T. Dysart, president, St. Louis Chamber of Commerce.
1:30 p.m.—General Sand Session
Chairman, T. C. Hamlin, U. S. Radiator Corp., Edwardsville, Ill. Speakers, Harry W. Dietert, Harry W Dietert Co., Detroit, and N. J. Dunbeck, Eastern Clay Products Co Eifort, O.
3:15 p.m.—Steel, *Gating and Feeding*
Chairman, H. M. Rishel, American Steel Foundries, Granite City, Ill Speaker, A. Johnson, Oklahoma Steel Castings Co., Tulsa, Okla.
3:15 p.m.—Gray Iron, *Gating and Risering*
Chairman, C. B. Shanley, Semi-Steel Casting Co., St. Louis. Speaker, O. J. Belzer, Banner Iron Works, St Louis.
7:00 p.m.—Conference Dinner
Chairman, Lee E. Everett, chapter chairman. Speaker, Karl Landgrebe, Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.

Saturday, Oct. 7

9:00 a.m.—Round Table Discussions
Gray Iron, Chairman, Carl Morken, Carondelet Foundry Co., St. Louis.
Melting Practice, Discussion leader, G. P. Phillips, International Harvester Co., Chicago.
Core Making, Discussion leader, L. P. Robinson, Werner G. Smith Co., Cleveland.
Steel, Chairman, F. X. Hahn, Scullin Steel Co., St. Louis.
Application of Internal and External Chills, Discussion leader, W. F. McKee, Key Co., East St. Louis, Ill.
Core and Mold Washes, Discussion leader, P. J. Dapkus, Decatur Milling Co., Decatur, Ill.
Nonferrous, Chairman, F. O'Hare, Central Brass & Aluminum Co., St. Louis.
Defects in Nonferrous Castings, Discussion leader, Arthur Fritschle, Federated Metals division, American Smelting & Refining Co., St. Louis.
10:00 a.m.—Special Student Session
Chairman, C. Y. Clayton, professor, Missouri School of Mines and Metallurgy, Rolla, Mo. Speaker, C. R. Culling, Carondelet Foundry Co., St. Louis.



Carondelet Foundry Co., St. Louis, is one of the plants on the visitation schedule of the St. Louis Regional Conference

Regional Conference For Baltimore

Foundrymen of the Maryland, Virginia and the District of Columbia area will have a chance this fall to participate in a regional foundry conference of a type which has become so popular in other sections during the past few years. The conference is being planned at the request of many members of the territory who have felt the need of group technical meetings for the many shop executives of their foundries.

The tentative plans developed by a committee, which first met during the Cincinnati A. F. A. convention, provide for a 2-day meeting, Friday and Saturday, Oct. 20 and 21. The conference will be held at the Lord Baltimore hotel, Baltimore. A conference committee

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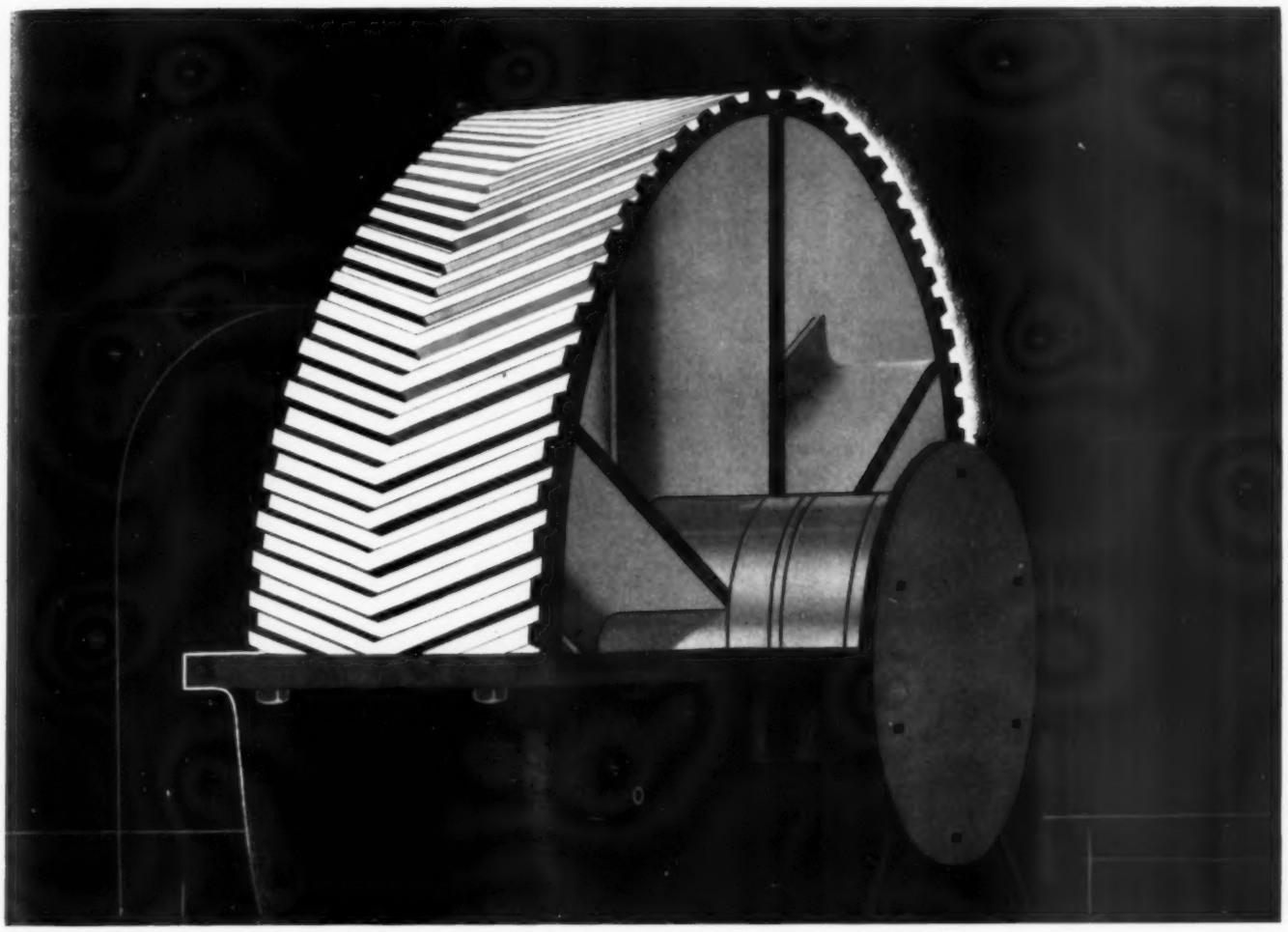

A CASE OF STANDARDIZATION

The fewer the different steels with which a foundry works, the simpler its operation, the better the techniques it develops — and the lower its costs. Standardization brings competitive advantages to the foundry, service benefits to its customers.

Molybdenum steels frequently make such standardization possible. For example, a large foundry uses cast Manganese-Molybdenum steel for an entire line of herringbone, single helical, and spur reducer gears up to 60 inches O.D. with hardness specifications ranging from 180 to 270 B.H.N. and corresponding variation in required strengths. With this versatile steel, the specified hardnesses and physical properties are obtained simply by varying the heat treatment.

In addition, cast Manganese-Molybdenum, being free cutting at high hardness, permits machining of the uniformly sharp and even teeth required.

Molybdenum steels, both cast and wrought, are keeping down costs and bettering performance in many such cases. Our book, "Molybdenum in Steel," giving practical data, will be sent free on request to production executives and engineers.

PRODUCERS OF MOLYBDENUM BRIQUETTES, FERRO-MOLYBDENUM, AND CALCIUM MOLYBDATE

Climax Mo-lyb-den-um Company
500 Fifth Avenue · New York City

MOLY

(*Concluded from page* 44)

is being organized under the direction of Paul S. Lane, American Hammered Piston Ring division, Koppers Co., Baltimore. Tentative plans call for several sessions to discuss the more practical problems of foundry operations and plant visitations to some of the industrial firms.

Tentative schedule of events is as follows:

Friday, Oct. 20

Registration, Lord Baltimore hotel
9:30-10:00 a.m.—Open Meeting
10:30-12:00 a.m.—Gray Iron Shop Course, Cupola Practice
Nonferrous Shop Course, Bronze Melting Problems
12:30- 2:00 p.m.—Round Table Luncheon, Steel and Malleable Problems
2:00- 4:00 p.m.—Gray Iron Shop Course, Alloyed and High Test Cast Irons
4:00- 5:00 p.m.—Microscope in Elementary Cast Iron Metallurgy
6:30 p.m.—Conference Dinner
8:00 p.m.—Sand Control, Gray Iron, Nonferrous, Steel

Saturday, Oct. 21

10:00-12:00 a.m.—Gating and Risering, Cast Iron and Nonferrous
12:30- 2:00 p.m.—Round Table Discussion, Cupola Maintenance
2:00- 4:00 p.m.—Information Please? Open Forum answering of written and oral questions on various foundry problems.
4:00- 5:30 p.m.—Microscope in Elementary Cast Iron Metallurgy

The tentativev conference committee organization is given below:

Executive Committee: Paul Lane, American Hammered Piston Ring division, chairman; J. E. Crown, Naval Gun Factory, Washington, vice chairman; Max Kuniansky, Lynchburg Foundry Co., Lynchburg, Va.; C. M. Saeger Jr., Bureau of Standards, Washington; E. Horlebein, Gibson & Kirk Co., Baltimore; E. R. Hall, Koppers Co., Baltimore; Frank Kennedy, Kennedy Foundry Co., Baltimore.

Meetings committee, W. C. Frantz, Flynn & Emrich Co., Baltimore, chairman; R. T. Covington, American Hammered Piston Ring division, Baltimore; J. C. Pendleton, Newport News Shipbuilding & Drydock Co., Newport News, Va.; L. H. Fawcett, Naval Gun factory, Washington.

Plant visitations, H. Schaufus, Rustless Iron & Steel Co., Baltimore; H. B. Gardner, Bureau of Standards, Washington; A. Reese, American Hammered Piston Ring division, Baltimore.

Reception and registration, James J. Lacy, James J. Lacy Co., Baltimore, chairman; S. W. Brinson, Navy Yard, Washington; C. W. Knobeloch, Bartlett Hayward division, Baltimore; Frank Flynn, Kennedy Foundry Co., Baltimore.

Dinner and entertainment, H. E. George, American Hammered Piston Ring division, Baltimore; W. W. Levi, Lynchburg Foundry Co., Lynchburg, Va.; C. L. Frear, Bureau of Engineering, Navy department, Washington.

Publicity and attendance, I. N. Mosely, Norfolk & Western Railroad shops, Roanoke, Va.; H. F. Taylor, Naval Research Laboratory, Washington; W. J. Jeffries, Bureau of Construction and Repairs, Navy department; C. W. Miller, Bartlett Hayward division, Koppers Co., Baltimore; John M. Robb, Hickman, Williams & Co., Philadelphia; A. Y. Gregory, Whitehead Bros. Co., New York; R. Vining, Revere Copper & Brass Inc., Baltimore; John Ludwig, Electro Metallurgical Co., New York.

Quad City To Hold One Day Meeting

The Quad-City chapter of the A. F. A., the Illinois-Southern Wisconsin chapter of the A. F. A., the Northern Iowa Foundrymen's association and the University of Iowa are sponsoring a 1-day foundry meeting at Moline, Ill., Oct. 20. Registration, technical sessions and the dinner meeting will be held at the LeClaire hotel. A special plant visitation program is being arranged for both morning and afternoon and trips will be made to several foundries in the district including the Farmall plant of the International Harvester Co., John Deere Harvester works and the John Deere Spreader works. A get-together luncheon will be held at noon with a dinner meeting in the evening followed by the technical session.

The technical program is as follows:

Friday, Oct. 20

8:00 a.m.—Registration at the LeClaire hotel
8:00 a.m. to 12:00 m.—Plant visitation. Information will be available at the registration desk.
12:30 p.m.—Get-together luncheon at LeClaire hotel
Afternoon—Plant visitations
Golf, Short Hills Country club
6:30 p.m.—Dinner meeting and technical session

BOARD of directors of the American Foundrymen's association met at the Palmer house, Chicago, July 26. Seated from left to right around the table Duncan P. Forbes, Gunite Foundries Corp., Rockford, Ill., director; Fred J. Walls, International Nickel Co., Detroit, director; Jennie Reininga, assistant secretary-treasurer; Herbert S. Hersey, C. O. Bartlett & Snow Co., Cleveland, director; Alfred Walcher, American Steel Foundries, Chicago, director; Otto A. Pfaff, American Foundry Equipment Co., Mishawaka, Ind., director; Chambers R. Culling, Carondelet Foundry Co., St. Louis, director; Hyman Bornstein, Deere & Co., Moline, Ill., director and past president; W. H. Doerfner, Saginaw Malleable Iron division, General Motors Corp., Saginaw, Mich., director; C. E. Hoyt, executive vice president; Henry S. Washburn, president; W. J. Hennessey, manager, Convention bureau, Chicago Association of Commerce and luncheon host; Lester N. Shannon, Stockham Pipe Fittings Co., Birmingham, Ala., vice president; James R. Allan, International Harvester Co., Chicago, past director; E. O. Jones, treasurer and director of safety and hygiene; H. B. Hanley, American Laundry Machinery Co., Rochester, N. Y., director; Thomas Kaveny, Herman Pneumatic Machine Co., Pittsburgh, director; Marshall Post, Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa., director and past president; C. E. Westover, chairman, Chicago chapter and superintendent, Burnside Steel Foundry Co., Chicago. Standing left to right, Norman F. Hindle, technical secretary, William B. Coleman, W. B. Coleman Co., Philadelphia, director; James L. Wick Jr., Falcon Bronze Co., Youngstown, O., director and past president; Robert E. Kennedy, secretary; L. W. Olson, Ohio Brass Co., Mansfield, O., past president. Plans were discussed for the convention and exhibition in Chicago, May 4 to 10, 1940.

DEVELOPMENT

NEW POST TYPE JOLT SQUEEZERS

NO. 210 - PJ : 10" SIZE
NO. 212 - PJ : 12" SIZE

• All the time-proved advantages of Osborn Jolt Squeezer Moulding Machines, perfected over the years, have been combined with important new features. Every detail of the new Osborn Post Type Jolt Squeezer is designed to help the moulder produce uniformly high quality moulds with minimum effort.

Among the noteworthy developments is the beam type squeezer head with supporting bracket at rear which provides accurate, powerful squeeze action with minimum deflection. The new squeeze head, hand grip and rubber cushioned match plate holder are easily adjustable for either right or left hand swing.

These and additional features are indicated on the opposite page. Complete information will be furnished promptly.

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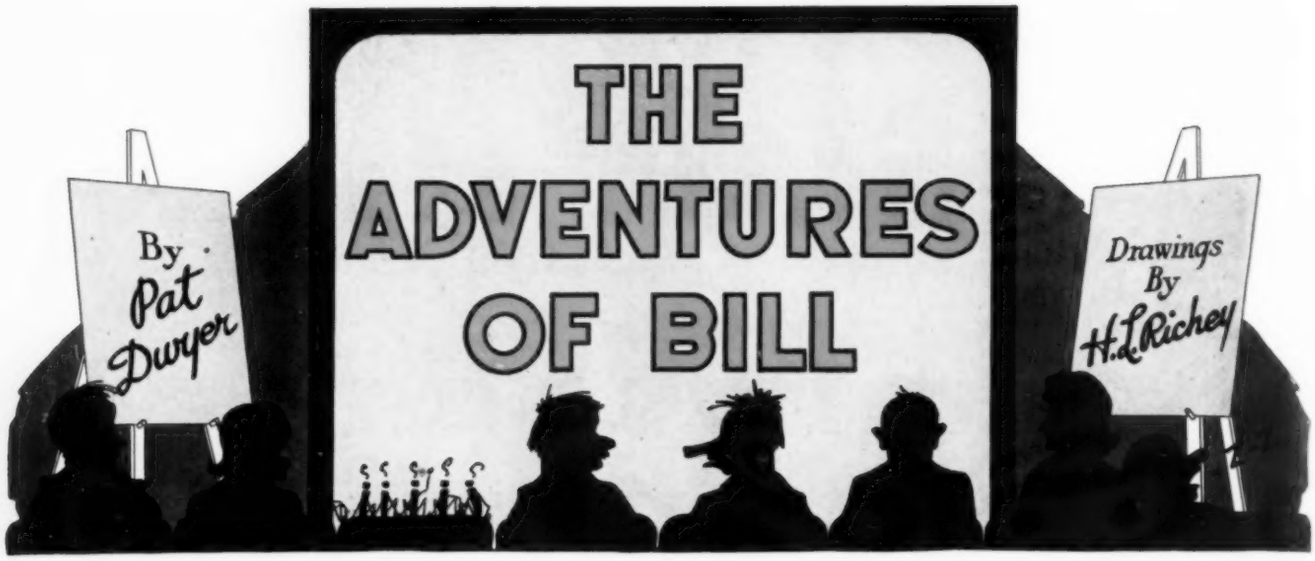


OF COURSE," said Bill, "the thing is entirely out of the question and even if it was possible it might not work out to my satisfaction, but just the same do you know what I should like to do if I was foot loose and fancy free and had the magic formula for turning time backward 40 or 50 years?"

"What's the use," I pointed out, "of wasting your time and mine in idle speculation? I am no mind reader, clairvoyant or peeker into the present, the past and the future to guess what harebrained ideas are milling around in your mind. In the second place, as you so kindly and graciously admit, you have no magic key to wind up old Father Time and start him off on the backward trail. I don't know what you would like to do if you could wipe out half a century, but I know what you should do now."

"Always glad to consider any worthy suggestion my good man. You have our permission to proceed."

"Less of the our and less of the permission if you please. That line, fortunately only familiar to me through certain screen offerings, always gives me a severe pain. The last time I heard it a few months ago, it was repeated so often by a pitiful puppet addressing better men than himself, that I was definitely alienated from an otherwise grand presentation of a historical subject."

"That's the proper spirit my stout fella! I regret I was not with you to lend any necessary support in croosting a few rocks. However, I also regret that you can't take a joke, or cannot distinguish between solemnity and levity. 'Tis a serious affliction, but I am afraid at your time of life nothing can be done about it. Now if I was in your place—"

"One thing at a time my dear young fellow. One thing at a time. A few minutes ago you wanted to jump into a ragged pair of short pants and a calico shirt with one button, and now you are just as willing to take my place, sight unseen, and set an example for all men to shoot at. The fact that you hop around like an eel in a frying pan shows that my original diagnosis was correct and that it was my duty to suggest what you should do now."

"Old Shamus Means the medicine man himself! So long as you don't prescribe a bag of asa-fotiddy instead of an agnes day to hang around my neck—"

"What you need is to have one of these modern doctor lads go over you with the tools and test you for blood pressure, permeability, moisture content, hang nails, warts, sight and hearing. Indications all point to senile decay or second childhood.

"However, as we medical men often say to each other, there is an interesting point of difference between first and second childhood. In childhood and youth the immature mind is not concerned with the past, but is filled with visions of the future. In the second stage after everything has gone stale, a man's mind reverts with pleasure to the hilarious and carefree days of youth when every goose was a swan, lad, and every lass a queen. Furthermore—"

Brake Bands Need To Be Tightened

"Furthermore and in addition," Bill interrupted, "you are all wet and should be out in the goose pond with the other geese. Your cork screw line of reasoning brings you out exactly on my platform. A natural desire to go back to the old days is no more a sign of mental decay in a grown up man—in the best of health and spirits as my Uncle Malachi used to say glory bitogod—than a somewhat similar desire on the part of youth for the anticipated fortune of the future, is a sign of feeble mindness on the part of a boy. In fact if anything, and based strictly on points, the man has the better excuse for day dreaming. The boy does not know what is ahead of him and dreams in ignorance. The man has been through the wringer and knows that, never, never again if he lives to be 157 years old will he experience the poignant thrill of ecstasy over first experiences. the first bird's nest, the first fish, the first shot from a gun, the first pair of skates, the first dance, the first buggy ride and the first touch of a maiden's lips.

"All of which brings us back to where I started when I asked you if you knew what I should like to do if I could turn back the clock. In company with two or three other lads whose responsibilities rested as lightly and could be blown away as easily as thistle down, I should like

(*Continued on page* 53)

to spend a day roaming the banks of a certain creek which flows into a large river just above the railroad bridge."

"I know where it is," I said, "the old Iron bridge. I have walked across hundreds of times, but I never shall forget the mortal terror that gripped my small soul as I crept across like a snail the first time. A single line of track was laid on sleepers spaced about 12 inches apart, just far enough I was firmly convinced to let me slip through and fall into the river gleaming hungrily far below. The added fear of a train entering the bridge any minute from either end was all that kept me upright and in motion. I was frightened to look up to see if a train was coming, frightened that my feet should miss one of the sleepers when I looked down to make sure I was stepping on a sleeper and not on empty air. I imagined I heard a locomotive roaring down to smear me over the sleepers like a red streak. To finish that first journey across the old iron bridge required more courage than was displayed by Kipling's young scalawag fifer and drummer in the 'Drums of the Fore and Aft.'"

"Well," said Bill, "courage or no courage, apparently you made it or you would not be sitting there now smugly bragging about it. Just another example of how people worry about things that never happen. As I look back now on the years between 10 and 20 we lived in a perfect garden of Eden without a trouble or care compared to the present day with every street in the city and every road in the country infested with automobiles running free and hog wild, piloted in too many cases by drunken morons whom a sensible employer would not trust to drive a wheelbarrow. Do you know what I should like to do?"

"Certainly," I said, "You would have one automobile license issued each year and that license should be issued to you. If my memory is in good working order you had no automobile when you started off on the fishing trip you were dreaming about some time back."

"Automobile? If the entire financial resources of that particular gang was dumped in a tin cup we would not have had enough to buy a hub cap. We knew nothing of automobiles in those days and—as I learned many times in later years—what you never had, you never miss. We walked to and from the various fishing places, any distance from 1 to 5 or 6 miles and had more fun and interesting experiences than the modern lad who drives himself or is whisked by a chauffeur over 400 or 500 miles of concrete roads between dawn and dusk.

"I should like to throw away shoes and socks, coat, vest, collar and tie and tramp along a country road with my feet sinking into the warm soft and velvet dust at every step and with little jets spurting up between my toes. I should like to chase a squirrel for half a mile along a zig-zag fence and throw enough stones on the journey to build a cairn—if they were all collected—7 feet square at the base and 7 feet, 6 inches high. I should like to climb a tall tree and feast my hungry eyes on a set of crow's eggs, dark green with black markings; or better still find the young crows old enough to be carried home and tamed for pets. You clip their wings and their tail feathers to prevent them from flying away for the first couple of months. After that they hang around voluntarily and steal anything that is not too hot nor too heavy. I had a pair one time with stiff red felt cock combs glued on top of their heads. The combs altered their entire appearance and they were as proud and as funny looking as some of the ladies you see today in their new hats. People stopped to look at them in astonishment—"

"The hats?"

"No, the crows with the crowns. They finally flew away in the Fall and I often have wondered what kind of a reception they had from their wild brethern."

"Probably deposed and ridiculed," I said, "the usual—though often deferred—fate of those who attempt to swagger around in borrowed plumage. 'Twould be interesting to speculate on whether this particular pair of crows transmitted their crowns to their immediate descendants."

"Well," said Bill, "I'll tell you. They would not be the first pair of crowned heads to acquire these ornaments without any effort on their part, nor the first pair to pass them along with all the emoluments to members of the second generation, who outside of being born within the royal stronghold, never did a tap of work, or indicated in any other manner that they were entitled to special preferment. Always been a mystery to me why presumably intelligent people should select a family, frequently without any particular qualifications, bow down and worship them and support them in luxury all their lives.

"Seems to me," I said, "you have taken on a sufficient number of jobs for one day. You start off on a fishing trip in your bare feet with a pole over your shoulder. You offer advice on how I should spend the remainder of my life. You hop blithely along a country road chasing squirrels and things, innocent little furry creatures minding their own business and not interfering in the slightest degree with your inalienable right to life, liberty and the pursuit of happiness. You steal a batch of young crows from a mother's nest, hold them in captivity for a season and convert them into ob-

(*Concluded on page* 56)

Deer slayer takes a gander through the wood to visit his little furry friends

AMONG DETROIT FOUNDRIES

By A. H. ALLEN
Detroit Editor, The Foundry

TWO large sand mixing mullers have been installed in the Cadillac foundry as part of an extensive program of re-equipment, particularly insofar as sand handling and conditioning are concerned. The mullers have a capacity of 3000 pounds each, and are designed to treat a full charge of sand within 2 minutes. The equipment serves to increase the amount of sand which can be handled, thereby removing any bottleneck from that score, and also supplements benefits already derived from air conditioning units.

Also involved in the Cadillac foundry improvement is an estimated ¼-mile of belt in nine new conveyor systems which carry the sand to 150-ton storage, fluffing and surge bins, and later transfer it to molding machine stations on the foundry floor. Expenditure on the Cadillac foundry is probably among the largest made this summer in any of the automotive foundries in the Detroit area, excepting the Ford Motor Co. Others have had minor programs of equipment modernization aimed toward more efficient foundry practice, with emphasis upon the materials handling aspect.

Dodge, for example, has installed a lengthy conveyor system in the foundry building for bringing cores from the coremaking departments on second and third floors to the main floor where molds are assembled. Formerly cores were trucked to the main floor by elevator. The new overhead chain conveyor system will save considerable time over the former method, in addition to bringing cores directly to molders at the proper height for quick positioning in the molds.

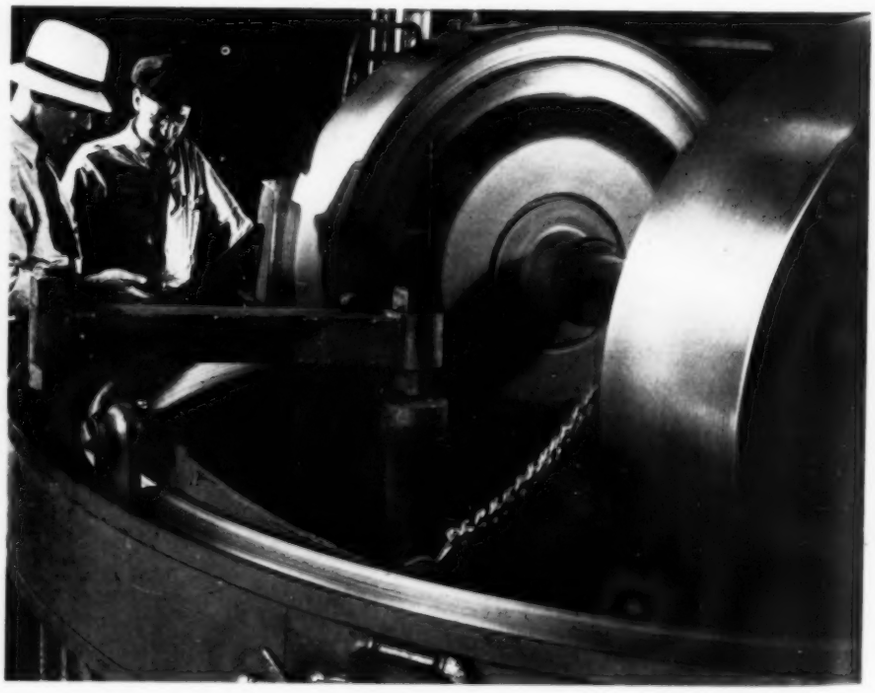
Pontiac has installed at least one new blast cleaning machine, as well as a few new molding machines, but generally speaking has undertaken no extensive program of improvement in the foundry. It is understood that some consideration has been given to the matter of putting in complete new and expanded cleaning facilities for castings, but that the move is at least a year away.

Some equipment has been purchased for the foundry of the Budd Wheel Co. in Detroit, which produces gray iron and steel castings. Further it is reported that the Budd interests are proposing to enter new lines, such as cylinder sleeves. Present operations are centered almost entirely on cast iron brake drums which are supplied to a number of car manufacturers.

Packard was the first to unveil its product for 1940, a crowd of 4500 dealers and distributors gathering at the Packard proving grounds near Utica, Mich., Aug. 8 for the initial showing of the 110, 120, 160 and 180 models. The same week, a driveaway of the first 4500 cars produced was staged, said to be the largest driveaway in the history of the industry.

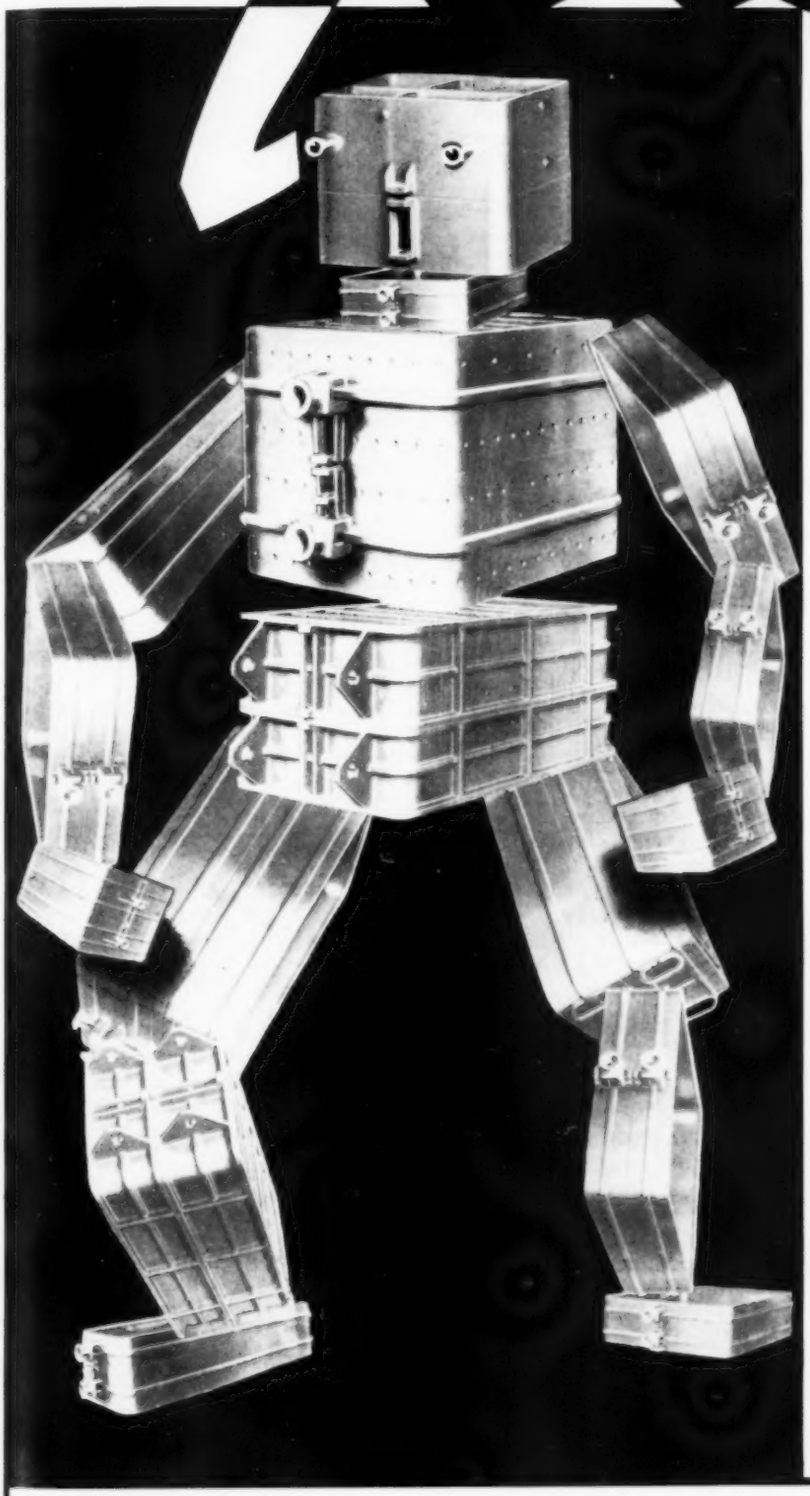
The 110 model is a 6-cylinder, the rest 8-cylinder jobs. Engine for the

(*Concluded on page* 56)



One of two large muller type sand mixers recently installed by Cadillac Motor Car Co., Detroit is inspected by L. W. Thayer and John Dernecoeur, general foremen of the foundry

Tough



Service in more than three thousand of America's leading foundries has proved that Sterling Flasks are tough!

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Their design . . . and the material used ensure rigidity and maximum resistance to corrosion.

Sterling Flasks give you strength to spare—with the minimum of weight.

STERLING FLASKS available in any style, size or shape you may require—from small bench type to the largest sizes.

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(*Concluded from page* 54)

160 and 180 models, an eight, is completely new this year, calling for additional tonnage from the foundry. It succeeds the former super-eight and 12-cylinder engines, the former of which had an aluminum crankcase. The new engine is more powerful than the former super-eight and is all cast iron. It also is reputed to out perform the former 12.

Currently the Packard foundry is pouring about 190 tons a day on one shift. Many of the other departments of the plant, such as the machine shop are operating two shifts, but by virtue of an early start, June 12 to be exact, the foundry was able to build up a bank of about 10,000 engine blocks and thus avoid having to work two shifts during the hot weather. Probably by the end of September it will be necessary for the foundry to go to two shifts to keep step with assemblies, in view of the fact that late in August the bank of blocks was being eaten up steadily. New power conveyors have been installed for handling blocks during cooling and grinding, supplanting former gravity conveyors. A core oven also has been rebuilt, adapting indirect gas firing.

Three engines will serve to power the entire Hudson line for 1940—two sixes and an eight—with horsepower, respectively, of 92, 102 and 128. The 102 and 128-horsepower engines are used interchangeably in two series of cars, the deluxe six and eight, and the Country Club series. In six-cylinder engines, the distributor is now mounted at the rear of the cylinder head, calling for a change in block casting specifications. The change was made to permit shorter wire harness and greater accessibility.

Present New Front End

In addition to a completely restyled front end, with broad die cast horizontal concave grilles, the new Hudson lines have switched to independent front wheel suspension with coil springs and a wishbone-type of supporting structure. This is used in conjunction with center-point steering and *autopoise* control, the latter being a system of interconnected rods and braces which hold the front wheels on a truer course.

A use for gray iron castings in large quantities that is probably not generally appreciated by foundrymen is in large grinding wheels used to grind and polish plate glass. On a recent inspection trip through the plant of Libbey-Owens-Ford Glass Co. in Toledo, O., these wheels were seen in operation. Machines in which they are used are of Belgian design and manufacture, comprising a score of stands, each carrying three vertical spindles on which the grinding wheels are mounted. The wheels turn and reciprocate over the glass surface which passes slowly beneath them. The wheels are about 36 inches in diameter and are cast with a series of blunt cutting teeth spaced irregularly around the surface. These teeth, about 5 inches deep, are flat on the outer ends and wear down rapidly from the constant abrasion with the glass, plus the action of polishing compound which is sluiced over them continually. However, the wheels are kept in service until worn practically smooth. Similar but larger wheels are used to grind plate glass in the plant of the Ford Motor Co., Detroit.

American Furnace & Foundry Co., Milan, Mich., is adding to its plant facilities and will have 15 molders at work when the expansion is completed.

Adventures of Bill

(*Concluded from page* 53)

jects of suspicion to their fellows by attaching high red combs on their heads. Now you calmly propose to knock the props from under the sacred institution of royalty. I don't think they would like that!"

"Maybe not," said Bill, "but they would have plenty of company. Millions of men in this country, able, willing and anxious to work as a means of support for themselves and families, and incidentally as contributors to the national income, have not had a chance to earn a dime for the past several years. I don't think they like that.

"However, as you cagily and cannily point out the job of straightening out the industrial and economic mess is a little too heavy for me to tackle alone. Reminds me of the colored gent who got a job on a railroad unloading big, heavy ties from a flat car. At the close of the day, practically all washed up, he had a few words with the boss. 'Boss,' says he, 'you sure you got my name right?' The foreman looked over his list. 'Sure,' says he. 'Here you are, Simpson—George, Leonidas, Bluegrass Simpson. That's right isn't it?' 'Yas suh boss, dass right' says our hero, 'George, L. B. Simpson, dass me. Name I've always had. Ah thought mebbe you had me down in your book as Samson!' "

Is Representative

Independent Foundry Supply Co., 2325 East Thirty-eighth street, Los Angeles, has been appointed representative for the Beardsley & Piper Co.

Gives Data on Gray Iron Properties

Gray Iron Founders' society, 1010 Public Square building, Cleveland, recently has published the results of an intensive survey of available basic information on the engineering properties of gray iron castings. This survey, which was conducted by the Battelle Memorial institute, Columbus, O., is presented under the title, *The Engineering Properties of Gray Cast Iron.* It is anticipated by the society that the information included in the book not only will afford a useful guide to foundrymen, but will assist in efforts to guide prospective customers into the paths of sound buying.

The book constitutes a critical bibliography of the technical literature. It is divided into four sections of which the first contains the most reliable data on common mechanical properties in tabular form. Properties not ordinarily determined or not expressed in a simple test are given in section two. Section three is a selected bibliography with comment on inter-relation of various properties of gray iron while the concluding section comprises a bibliography of literature grouped by topics. The book is a well worthwhile addition to literature on gray iron, and brings together in concise form information that hitherto has been widely scattered.

Equipment Makers Plan Meeting

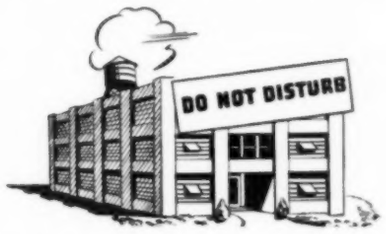
Foundry Equipment Manufacturers' association will hold its annual meeting at the Greenbrier hotel, White Sulphur Springs, W. Va., Friday and Saturday, Oct. 6 and 7, according to a recent announcement of Arthur J. Tuscany, executive secretary and treasurer. The meeting, originally scheduled for earlier in the year, was postponed so that it might come during the fall season and permit the meeting at a resort location.

In addition to handling such regular business as election of three directors to serve for the ensuing 3-year period, the meeting will engage a carefully prepared clinic of the business situation in the equipment field. In view of the fact that considerable importance attaches to employment in the capital goods industry, of which foundry equipment is a very definite part, the program should prove very interesting.

All manufacturers of equipment used in the foundry industry are invited to attend.

SPO TALKS PRACTICALLY

A frankly literal record of a foundry situation — and how it was handled.



"Don't disturb our floors!" When your foundry is on the third floor, you just can't have vibration. Here is how a manufacturer of high pressure valves who is very zealous of his product heightened its quality and trebled his output.

The Situation. This high pressure valve had to be made on a third floor foundry. Jolting by machine was "out". The manufacturer's policy called for careful comparatively slow work. The mold was hand-rammed and squeezed.

The Contribution. The job was put on a SPO No. 814 Oscillating Roll-over Pattern Draw Machine. The same pattern equipment was used (no extra expense).

The Result. Production jumped approximately 150%. Castings are much more uniform in shape as well as in weight, so that the extreme variation now is not more than one ounce in a day's run, as contrasted with a variation of as much as six ounces by the former method. (The average weight of the castings was 8½ pounds.) Ram-offs and pack-aways are virtually unknown, with increased accuracy and attendant saving of metal. Even ramming is obtained because the SPO machine utilizes the flowability of the sand, keeping it in constant motion until the grains interlock by the squeeze pressure. This procedure takes the place of jolt-ramming the sand. Dryer, more open sand can be employed, insuring better permeability.

The services of a SPO engineer are at your call.

Note in the above illustration, which is practically unretouched, the clear, sharp corners of the casting and the absence of joint fins.

•

SPO designs and builds both molding machines and pattern equipment, and guarantees them unconditionally to produce castings which will be in accordance with your specifications.

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Manufacturers and Specialists in Molding Machines, Vibrators, and Patterns for Production

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International Congress PAPERS

DISCUSS MANY PROBLEMS

AN EXCEPTIONALLY wide variety of foundry problems were discussed in the papers presented at the technical sessions of the International Foundry congress held in London, June 12 to 17. General features of the congress were described by Vincent Delport in the August issue of THE FOUNDRY, and brief abstracts of the papers are presented on this and following pages.

A paper entitled "Compounding of Alloys," presented in behalf of the Association Technique de Fonderie de Belgique, included a brief discussion of the various factors which should be considered in melting metals and alloys to obtain sound castings. Factors discussed included oxygen in copper, rusty scrap in malleable, high sulphur scrap in the open hearth, cleanliness of nonferrous scrap, advantages of ingotting scrap, influence of atmospheric humidity, impurities absorbed during melting, occluded gases, influence of melting temperatures, pouring temperatures, and protection and cleaning the molten bath.

On behalf of the Czecho-Slovakia Foundry association, N. Chvorinov, Skoda Works, Pilsen, prepared a paper on "Control of the Solidification of Castings by Calculation." The discussion formulates the relationships of solidification, which can be used to determine the solidification period of any casting. The author gave the relationship between solidification period and the thermal properties of various molding materials.

According to the author the formula can be applied to calculate the solidification period of any metal cast in molds of any thermal properties. Hence, a quantitative calculation is given which makes controlled, directional solidification subject to mathematical control. For controlling solidification the author suggests the use of magnesite brick, crushed magnesite, silicon carbide, steel turnings mixed with sand, and indirect chills—that is iron chills which are protected from direct contact with the molten metal by a layer of sand.

Skin Resists Corrosion

A paper, "Pitting Corrosion of Cast Iron and Steel Pipes," by Dr. L. Olansky, Municipal Gasworks, Brno, describes an investigation on corrosion resistance of those materials, using 5 per cent nitric acid as the corroding agent. The author found that the as-cast skin on cast pipe, and the oxide formed during rolling steel pipe increased corrosion resistance. The outer layer of material immediately beneath the as-cast skin or the scale is much more resistant than the internal layers.

His results indicate that the as-cast skin or the scale and the layers of the surface situated directly behind them at those places which are opposite to points where corrosion began, have no influence on resistance to corrosion. He stated that it is only desirable to make a comparative test on cast iron and steel pipe with the surface in the condition as it is laid since it is impossible to evaluate corrosion resistance on the basis of machined sections.

On behalf of the Polish Foundrymen's association, Stowarzyzenie Techniczne Odlewnikow Polskich, Dr.-Ing. Nicholas Czyzewski, Cracow, Poland, prepared a paper dealing with optimum blast volume for cupola practice. Through a series of calculations and highly intricate formulas he showed that by the employment of a good grade of foundry coke in quantity from 9 to 11 per cent and normal charges of metal, the optimum volume of the blast should be about 100 cubic meters per square meter per minute (Approximately 328 cubic feet per square foot). Optimum blast volume depends on the piping, the conditions of operation of the cupola and particularly on the quality of the coke. The blast volume increases with an increase in the consumption of coke and a reduction in its combustibility. Where a very high superheat temperature is required in the cupola the amount of coke should be increased with a consequent increase in the blast volume. Investigations conducted with various cupolas indicated that the time required to melt a charge of metal depends on many factors, principally the size and shape of the pieces of iron, and the height of the coke bed under the first charge.

Defects in Chilled Rolls

Defects in chilled rolls made from electrically melted iron were considered in a paper by Dr. Ing. Franco Bondi presented on behalf of the Federazione Nazionale Fascista degli Industriali Metallurgici. The author pointed out the advantages and disadvantages of electric melting for chilled rolls, and then passed on to a description of various defects which he grouped in five classes. The first is explosions during pouring, while the others include cracking, cavities and irregular surface of the roll body, brittle necks, and eccentricity and variation in hardness. Causes and possible remedies for each of the defects are indicated.

Dr. Ing. Massimo Barigozzi, Milan, Italy, provided on behalf of the Federazione Nazionale Fascista degli Industriali Meccanici, a paper entitled "Laws Governing the Operation of the Cupola." The author explained the various factors connected with combustion and melting, depicting them as formulas, and from those developed four simple diagrams which can be employed to adjust the variables of the cupola in agreement with industrial requirements.

Industrial legislation in South Africa was the subject of a paper by A. H. Guy which was presented on behalf of the South African branch of the I.B.F. The author described in detail the factories act, apprenticeship act, workmen's com-

(Continued on page 61)

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(*Continued from page 58*)

pensation, industrial conciliation, and the wage act.

An interesting paper on the "Position of the Development of Centrifugal Casting in Germany" by W. A. Geisler, Friedrich Krupp A. G., Essen, Germany, describes the history of the art, and gives detailed descriptions of various procedures followed in Germany for the centrifugal casting of ferrous and nonferrous alloys in the form of pipes, liners, valve seats, brake drums, etc. The paper also explains various methods followed to overcome certain difficulties encountered in producing sound, clean castings.

A paper on the subject of gating with special reference to the optimum flow conditions in the molten metal was prepared by Dr. E. M. H. Lips, Phillips Gloeilampenfabrieken, Kindhoven, Holland, on behalf of the Nederlandsche Vereeinging van Gieterij-Technici (Netherlands Foundry Technical association). The author claimed that the gating system on any casting should satisfy the requirement according to which the molten metal should be introduced into the mold in the best possible manner. On the basis of hydrodynamical principles this requirement may be satisfied in such a manner that the gating system promotes lamellar or streamline flow as much as possible; does not involve sudden changes in direction; is free from sudden changes in cross section. The diameter of the sprue must be small to attain the lamilar flow. This is the chief reason why a pouring gate should not be combined with a riser. Obviously a riser should be of comparatively large diameter. Several examples were shown to illustrate the design of a gating system based on hydrodynamical principles.

Poured Into Heated Molds

A paper entitled "Progress of Inverse Segregation During Solidification," by Dr. J. A. Vero, Royal Hungarian Palatine-Joseph university, Sopron, Hungary, describes experimental work on an alloy composed of 95 per cent aluminum and 5 per cent tin which was melted and poured into heated molds at a definite temperature. At various stages of solidification, the molds were tipped over and the liquid portion remaining was permitted to run out leaving solid shells of varying thicknesses.

Analyses of turnings taken from the shell in layers at depths of 2 millimeters, average of metal solidified in the shell, and average of the metal poured out, indicate that inverse segregation occurs at an early stage of solidification, becomes more extensive as solidification proceeds, and a considerable part occurs during the solidification of the last third of the ingot. From his work, the author indicates that the usual description of solidification processes of ingots with the aid of equilibrium diagrams classifying segregation as normal and inverse, is wrong.

Relationship between quality of iron and steel castings and nature of raw materials used was the subject of a paper by Dr. P. Bardenheuer, Kaiser-Wilhelm-Institut fuer Eisenforschung, Duesseldorf, Germany. The paper stated that considerable difficulty was encountered from gases in molten metal which either were dissolved in it or formed by the interaction of oxides with carbon.

The gases are partly present in materials composing the melt or are absorbed partly during remelting. Hydrogen is one of the most important gases since if liberated in the mold during solidification it forms gas cavities or blow holes while if liberated by reduction of solubility in the solidifying metal it will collect in a molecular state at the grain boundaries and at nonmetallic inclusions under a high pressure producing stresses in the casting. Various remelting processes are discussed to show how gases may be incorporated in the process, and the importance of degasification.

Effect of Heat Treatment

A discussion on "Solution Heat Treatment of Aluminum Casting Alloys," by Dr. Irmann, Aluminum Industrie A. G., Neuhausen, Switzerland, describes the type of furnace most suited for the operations, the procedure, and power consumption. For castings of 25 to 50 pounds the power consumed by a solution treatment of 3 hours at 530 degrees Cent. and a subsequent precipitation heat treatment of 12 hours at 160 degrees Cent. amounts to about 0.25 to 0.7 kilowatt hours per pound; the lower figure pertaining to heat treatment without a basket, and the higher to heat treatment with a basket.

The paper described the effect of heat treatment on mechanical properties, pointing out that the latter are dependent on the rate of solidification within the casting and on the duration of the solution and precipitation heat treatments. The concluding part of the paper described loss of strength of heat treated alloys due to exposure to elevated temperatures during a long period of time.

M. Hajek and J. Koritta, Ceskomoravska-Kolben-Danek Co. Ltd., Prague, in a paper entitled, "Influence of Repeated Remelting on the Properties of Light Alloys" describes a study which was made on the influence of repeated melting of 4 aluminum alloys. It was found that if remelting was carried out under carefully controlled conditions, it did not show any appreciable effect on the tensile strength and elongation.

All tests were carried out under normal foundry conditions, and no fluxes were used. The authors suggest that inferiority of remelted material is due to use of scrap of unknown composition or to bad melting practice, rather than to remelting itself.

In behalf of the Technischer Hauptausschuss fuer Giessereiwesen, Dipl. Ing. W. Patterson, Technical High School, Aachen, Germany, prepared a paper on, "Process of Crystallization in Commercial Alloys" which describes a modified process of thermal analysis as applied to the examination of a 13 per cent silicon-aluminum, modified type alloy. Results indicate that the time-temperature curves show whether or not sufficient sodium, the modifying agent, was present.

Investigate Clay Properties

Bonding clays and the properties of synthetic molding sands were discussed in a paper presented by G. H. Piper on behalf of the British Cast Iron Research association. A number of clays were investigated to determine their suitability as bonding agents for synthetic sand. Bentonite showed the greatest bonding power, but Dorset ball clay and a proprietary clay gave approximately the same green strength. China clays had low bonding powers. Fire clays varied. The author found a relation between the green strength and the tensile strength of moist clay. Dry strengths were determined at various initial moisture contents and temperature of drying up to 250 degrees Cent. (482 degrees Fahr.). Sands containing 3 per cent bentonite or 5 per cent of a proprietary clay respectively showed the highest dry strengths. The 5 per cent ball clay mixture while possessing adequate green strength, had low dry strength. Relation was found between bonding power and the quantity of water absorbed by the clays.

J. G. Pearce, director, British Cast Iron Research association, presented a paper, "Foundry Education and Training in Great Britain." The paper opens with a brief outline of recent changes and developments in education in so far as they affect entrants to the foundry industry. The position of apprenticeship is considered briefly and the necessity for both specific education and training for the industry is stressed. The major part of the paper deals with the present provision for the technical training of the operative or craftsman, the intermediate techni-

cal grade and the executive and higher grade.

For the craftsman, part time classes in technical colleges lead in general to the examinations in pattern making and foundry science and practice of the city and guilds of London institute. For intermediate technical grades the ordinary or higher national certificates issued in conjunction with the Institution of Mechanical Engineers may be endorsed in foundry science and practice. For the executive and higher technical grades brief reference is made to other full time schemes for foundry training and more complete reference to the British Foundry school which started in 1935 to provide young men who have had some foundry training and technical knowledge with a special 1-year course.

F. W. Rowe, David Brown & Sons Ltd., Huddersfield, discussed radiography in iron and steel founding. He traced the history of radiography from the early 1700 up to the present day and described principles of x-ray generation. Full details were given of visual inspection by fluoroscopy and radiographic inspection by both x-rays and gamma rays. In addition Mr. Rowe described the equipment used in his plant and showed numerous radiographs of iron and steel castings of various shapes and dimensions.

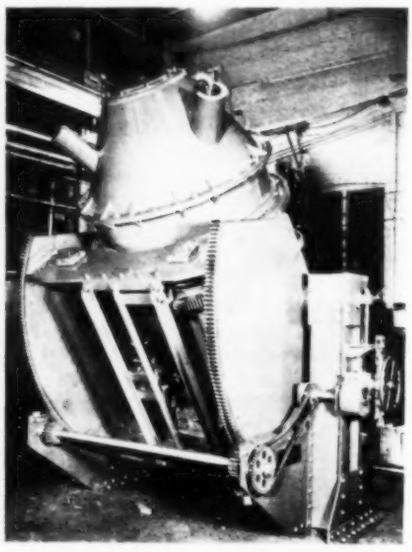
Melting Malleable Iron

In Great Britain the air furnace, rotary furnace, cupola and electric furnace are employed in the production of malleable iron. The open hearth furnace has been adopted in only two or three plants and results obtained appear to have varied to a considerable extent. A detailed description on the design and operation of an open hearth furnace for melting malleable cast iron was presented by G. R. Shotton, works manager Shotton Bros. Ltd., Oldbury. Fuel costs are given in detail, including the fuel consumption at all stages of soaking, preheating and melting 8 and 10-ton charges. Total fuel consumption including the boiler supplying steam to the gas producer is given as 7¾ cwts. of coal (868 pounds) per ton of metal melted when operating on 8-ton charges. On the 10-ton charge this figure is reduced to 6½ cwts. (728 pounds) per ton. Total melting cost including fuel, refractories and electric power shows 9s and 10s 6d ($2.16 and $2.52) per ton of melted metal, exclusive of labor, for 10-ton and 8-ton heats respectively.

In a paper on organization and development of steel foundry research, Wilfred John Dawson, Hadfield's Ltd., Sheffield, presented a brief outline of the development of research activities relating to steel founding. The paper stresses importance of educational facilities for training foundry personnel. In recent years considerable impetus has been given to educational movement. Special foundry centers for training and research have been established in all the principal industrial countries. Nature of the organizations devoted to foundry research in Belgium, France, Germany, Poland, United States and Great Britain is outlined in the paper. Work in Great Britain of the Steel Casting Research committee and its two subcommittees on molding materials and foundry practice is described in considerable detail. Summary of the three reports published is given. Reference is made to fluidity of steel, properties which affect the quality of steel castings, mechanical properties of steel cooling in the mold, radiological examination of castings and preliminary work in connection with the testing and improvement of molding materials. Lines on which further work might be pursued are indicated.

Dry Molds for Steel

Notes on dry sand practice for steel castings formed the subject of a paper prepared jointly by C. J. Dadswell and T. R. Walker, English Steel Corp. Ltd., Sheffield. Reference is made in the paper to the general subject of dried molds and the facing materials used in other countries. Foundry behavior of a dried material is influenced by its strength at high temperatures and also by its strength after subsequent cooling. Molds should be dried completely. Comparatively cold areas in the drying ovens should be avoided. Dried molds readily absorb moisture from the atmosphere with a consequent weakening of the mold face. Paints are applied to the surfaces of dried sand and composition molds. Composition and method of application are important. Composition has been used in Great Britain as a facing for heavy steel castings for many years, but now is meeting steadily increasing competition from dry sand. Further technical investigation now is under way on both materials.



A 1-ton brackelsberg type rotating furnace which will be used in Mexico. The unit is oil-fired. Photograph courtesy Whiting Corp., Harvey, Ill.

Nonferrous subcommittee of the technical committee of the I. B. F. presented a report on recommendations for 3 leaded bronze bearing alloys which gave information on investigational work leading up to the compositions submitted for approval. One designated LB2 contains 9 to 11 per cent tin, 4 to 6 per cent lead, up to 0.30 per cent phosphorus, up to 0.50 per cent zinc, up to 1.0 per cent nickel, and 0.5 per cent maximum other impurities. Maximum stress for the alloy is 12 tons per square inch while the elongation is 5 per cent.

Second alloy termed LB3 contains 9 to 11 per cent tin, 9 to 11 per cent lead, up to 0.30 per cent phosphorus, up to 0.50 per cent zinc, up to 1.5 per cent nickel, and 0.5 per cent other impurities. Maximum stress for the alloy is 11 tons per square inch, and elongation 4 per cent. The third alloy is LB4 which contains 8 to 10 per cent tin, 14 to 16 per cent lead, up to 0.30 per cent phosphorus, up to 1.0 per cent zinc, up to 2.0 per cent nickel, and 0.5 per cent maximum other impurities. Maximum stress is given as 10 tons per square inch, and elongation as 4 per cent.

Deoxidants Affect Conductivity

H. J. Miller, Copper Development association, London, presented a paper on "Copper and Copper Alloy Castings for Electrical and Thermal Conductivity Applications" which considers deoxidized types of copper with special attention to the influence of deoxidants and other elements on conductivity. Properties and uses of brasses, bronzes and other alloys low in conductivity, are described.

The paper reviews modern high conductivity, high strength alloys of a precipitation hardening type, outlining the properties of the copper-chromium alloys, the copper-nickel-silicon, the copper-cobalt-beryllium alloys, etc. In conclusion, the paper discusses founding aspects of copper, pointing out that the pronounced shrinkage due to absence of a freezing range, and weakness at temperatures just below the freezing point require special precautions.

While iron crucibles present certain economic advantages in melting aluminum alloys, they introduce a

(Continued on page 64)

PRECISION CONTROL of Fuel Oil Viscosity with

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FOUNDRY engineers are well aware of the importance of maintaining perfect, carbon-free combustion in any oil-fired unit. To this end, numerous elaborate controls have been devised to eliminate variables that disrupt uniformity. Yet all of this control may count for little, if variations occur in the viscosity of the oil at the burner nozzle. That, briefly, is why the VISCOSTAT was developed. That it is also able to contribute important savings in fuel costs, gives it the distinction of being a necessity that pays for itself.

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UNIFORM OIL VISCOSITY AT BURNER NOZZLE. Set the dial of the Viscostat at the figure corresponding to the viscosity (Sayboldt Universal) of your oil and it does the rest automatically. Equivalent viscosity at burner is held steady at 95-100.

MORE PERFECT COMBUSTION. With the "viscosity variable" completely controlled, it is possible to hold other setting steady over long periods of time.

NO CARBONIZATION OF OIL. The heating principle of the Viscostat utilizes large low temperature areas with rapid natural agitation to secure a high coefficient of heat transfer (K) of 75.

SPECIFICATIONS. Overall length, 17"; diameter, 7"; weight, 22 lbs. Capacity of standard model No. 20 is 20 gallons per hour.

TIME TESTED! Following are a few of the prominent users of Viscostat units: Western Metals Corp., Delta Star Elec. Co., Hodgson Foundry, Acme Aluminum Co., Modern Die & Forging Co., Phoenix Brass Co., Fisher Foundry Co., Jenkins Valve Co., Milwaukee Flush Valve Co., Howard Foundry Co., Central Pattern & Foundry Co., Chicago Aluminum Castings Co., Mfrs. Brass Foundry, Sloan Valve Co., Josam Foundry Co., United American Metal Co.

(*Continued from page* 62)
danger of contaminating the metal by iron, according to a paper by A. J. Murphy, S. A. E. Wells, and R. J. M. Payne, J. Stone & Co. Ltd., London, on "Effect of Melting Conditions on Light Alloys." However, the authors state that careful attention to applying protective wash lining to the crucible reduces that danger to a negligible amount. Unlined steel crucibles are suitable for magnesium which does not alloy with iron.

Fluxes containing fluorides and chlorides used for degassing will cause a loss of magnesium from aluminum alloys containing that element. In many aluminum alloys the grain size of castings is coarsened if the metal temperature is raised beyond 750 degrees Cent. A special grain refining addition such as niobium (columbium) or titanium prevents that. On the other hand grain size of magnesium alloys is refined by superheating to temperatures of 850 degrees Cent. or above.

In a paper "Effect of Melting Conditions on Gas Unsoundness in Metals," by G. L. Bailey, British Nonferrous Metals Research association, it is pointed out that two types of gas unsoundness are differentiated clearly. One is due to solution of an elementary gas such as hydrogen in the molten metal and its evolution on solidification. The second is due to the reaction on solidification of two constituents in solution in the melt, for example hydrogen and oxygen, to form an insoluble gas.

Main sources of gas contamination are the raw materials and the furnace atmosphere. It is suggested that the main source of hydrogen in nonferrous metals is by the reaction of molten metal with steam in the furnace atmosphere, and not by the absorption of hydrogen as such. Precautions to be taken during melting to minimize gas absorption are given, and principles of various methods for removal of dissolved gases prior to pouring are discussed briefly.

Discuss Light Alloys

Light alloy melting practice is the subject of a paper by W. C. Devereux, High Duty Alloys Ltd., Birmingham, England, which discusses the various types of melting equipment employed. Relative merits of crucible, low frequency induction, and open hearth furnaces for alloy mixing and ingot casting are given with comparative costs in several instances.

For sand foundry jobbing work, the crucible furnace will cover multitudinous requirements whereas for constant flow of small castings, iron pot furnaces permit continuous melting for long periods. For magnesium alloy melting oxidation and burning are of greater importance than gas absorption, and two general types of furnaces are employed. One is the lift out or tilting type crucible furnace using iron pots, and the other the dip out, iron pot furnace with totally enclosed top into which an atmosphere of sulphur dioxide gas can be admitted.

Dr. A. G. Street, Fry's Diecastings Ltd., Birmingham, England, presented a paper on the limitations and possibilities of pressure die casting in aluminum-base and zinc-base alloys in which he pointed out that only certain alloys are suitable for the process. Die casting is limited to the light casting field, and Dr. Street discussed the size and weight considerations. Proper mold design permits sound castings to be obtained, but with some types of castings trouble is encountered with entrapped air.

Die casting usually is possible economically only where quantities greater than 5000 are involved. Design of the casting is important in die casting and the author describes various features which must be considered. The paper concludes with a consideration of the use of aluminum-base and zinc-base die castings in a well known British washing machine.

Core Shop Control

Work in connection with a paper on core shop control presented by J. J. Sheehan, Austin Motor Co. Ltd., Birmingham, was carried out in an automobile foundry with sections for steel, gray iron and nonferrous castings. No clay bonded sands are used in the core shop. The technique has been built up around three sands: Large grain, medium grain, small grain. For coremaking alone the exact chemical composition is not of great importance, but it must be considered in the present instance since spent sands are utilized as the best grain for synthetic molding sands. By balancing the proportions of the three sands some measure of control over the following variables is possible: Permeability of the cores, amount of binder, finish on the casting, tendency to produce expansion cracks, sagging of the green cores. Theory and practice connected with the packing of sand grains were demonstrated through mathematical formulas, charts, drawings and photographs.

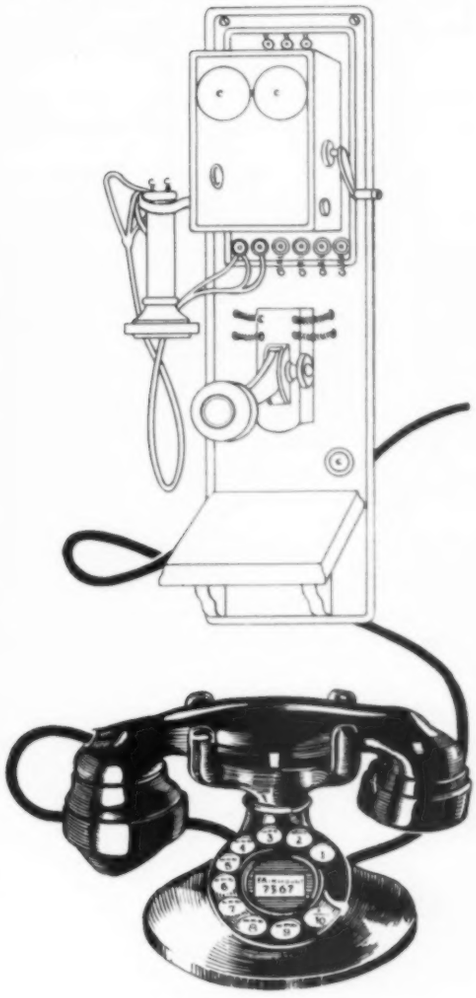
In a paper "Some Iron Castings for Steelworks Plant," J. Roxburgh, foundry manager Davy and United Engineering Co. Ltd., Park Iron Works, Sheffield, mentions initially the importance of practical and technical knowledge in the foundry industry and insists that the foundry executive of necessity should exam-

(*Concluded on page* 66)

Molders Have 70 to 80 Footcandles

THE new lighting installation in the foundry of the Wisconsin Appleton Co., South Milwaukee, Wis., provides adequate illumination for work at any time. The system consists of new 400-watt, 16,000-lumen, high intensity mercury lamps in reflectors designed by the Holophane Co., especially to accommodate the lamps. The units are installed 15 feet from the floor and on 16-foot centers. A lighting unit also is provided above each molder along the side walls of the foundry. The resultant lighting level is 70 to 80 foot-candles on the molders' benches. It is claimed that installation of the lighting equipment has speeded up the work and decreased spoilage.

FUNDAMENTALS ENDURE!



● There have been many changes in the telephone itself since it was first invented but the fundamental principle of carrying the voice by wire still endures.

So it is with Crucible Melting. Improvements have been made in the manufacturing of Crucibles and in the design of furnaces; melters have improved their methods—but, the adaptability, economy and flexibility of Crucible melting endures, unchanged and unchallenged, still producing a quality of metal unsurpassed by any other commercial melting method.

You owe it to your own melting problems, to your justifiable desire to show a profit on every job and to furnish castings that will satisfy your customers time after time, to investigate the many advantages of crucible melting.

Fundamentals endure! — and the fundamental of an honest profit is your right as a foundryman. Crucible melting will help you get it.

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(*Concluded from page* 64)

ine all phases of manufacture and be cognizant of the conditions of service of a casting before attempting production. In the main he states the properties of cast iron can be attributed to the amount and condition of the graphite and that, by the latter's reduction in quantity, refinement and dispersion, great improvements can be effected and that it is becoming more and more essential for the executive to decide on the ultimate structure. Composition, materials used in the mixture, melting furnaces, superheat, inoculation, artificial acceleration or prolonging the cooling rate, heat treatment exert influence on the ultimate structure of the metal. For typical illustrations the author presented detailed descriptions connected with the molding and casting of a considerable variety of large castings.

Describes Thermal Conductivity

J. W. Donaldson, Scott's Shipbuilding & Engineering Co. Ltd., Greenock, presented a paper entitled "The Thermal Conductivity of High Duty and Alloy Cast Irons," which gave results on that property of three series of cast irons. Thermal conductivities of the unalloyed irons range from 0.110 to 0.121 at 100 degrees Cent. according to their compositions. Conductivities of alloyed irons range from 0.101 to 0.119 at 100 degree Cent. while heat resisting iron conductivities range from 0.07 to 0.081 at the same temperature. Thermal conductivity in all the irons decreases as the temperature increases.

The author concluded from his work that influence of copper is to lower the thermal conductivity of gray cast iron in a manner similar to silicon and nickel although the effect is not so pronounced; being half that of silicon. Molybdenum tends to raise thermal conductivity similar to chromium and tungsten but to a lesser degree. Where nickel and chromium or nickel and manganese are alloyed together in cast iron, influence of nickel in lowering thermal conductivity is counteracted to a slight extent by chromium or manganese. Aluminum has a pronounced influence in lowering the heat conductivity property of cast iron even in the presence of chromium.

M. M. Hallett and A. B. Everest, Mond Nickel Co. Ltd., in a paper entitled "Specially Hard Alloy Cast Irons for Resistance to Abrasion" described the mechanism of hardening in a martensitic iron containing about 3 per cent carbon, 4½ per cent nickel and 1 to 1½ per cent chromium, known as ni-hard. They described in detail changes which occur during solidification and subsequent cooling of white iron.

In some cases improvement in properties of chilled iron alloy castings is obtained by heat treatment such as at 250 degrees Cent. for stress relief; tempering in the range 400 to 650 degrees Cent. to permit the austenite to revert to hard martensite during cooling from the tempering temperature, and reheating to temperatures above 750 degrees Cent. followed by cooling at controlled rates, and possibly by a final tempering.

Tools Cut Cast Iron

Cutting tools for cast iron were discussed from many angles by H. H. Beeny, Alfred Herbert Ltd., Coventry. Gray cast irons form a powdery swarf whereas ductile metals yield a continuous chip. The type and strength of the chip control the severity of heating, abrasion and stress, the principal influences tending to destroy the tool. Cutting stresses are not high with cast iron, but the metal is strongly abrasive due to the high carbon content, to skin conditions and to chilled spots and sand inclusions occasionally present. Cutting fluids rarely are used with a consequent rise in temperature. Machinability is controlled almost entirely by the combined carbon content and the tensile strength. Sintered tungsten carbide tools possess superlative hardness and resistance to abrasion and heat. Since the advent of carbide cutting materials, machine tools have been built possessing great static and dynamic stability with increased spindle speeds, ample driving power, improved lubrication systems and harder component materials. Chips are removed at three times the speed previously attainable.

Work of the technical committee of the I. B. F. was reported by J. W. Gardom, convener of the committee. The report is divided into two sections which deal with (a) the formation and working methods of the technical committee and (b) the technical reports which have been published by the institute during the past year and programs of work which the technical committee had completed and is carrying out at the present time.

The first section shows that the technical committee was appointed by the council of the institute in 1930 and that during the succeeding years several subcommittees of the technical committee have been appointed to study specific aspects of foundry practice and science. Thus at the present time there are the cast iron, steel castings, malleable cast iron, nonferrous, sands, refractories, and melting furnaces subcommittees in existence and functioning actively.

Republic To Operate Chateaugay Mine

Republic Steel Corp. has taken a 25-year lease with the Chateaugay Mining Co. for the operation of the Chateaugay mine in northern New York. The furnace near the mine has been closed and the ore is being converted into pig iron at Buffalo. J. R. Linney, vice president of the mining company, has joined the Republic organization, Robert Linney continues in charge of operation of the mine and William Linney has joined the Republic blast furnace department at Buffalo.

Market Handbook

A co-operative study by the bureau of foreign and domestic commerce, census bureau and the bureau of mines and entitled, "Industrial Market Data Handbook", recently has been published by the department of commerce. Information in the handbook is said to be useful in establishing new sales territories or reappraising old ones, setting up sales production quotas, planning sales and advertising campaigns, and deciding on channels of distribution likely to be most profitable to the manufacturer.

The handbook may be obtained from the superintendent of documents, Washington, for $2.50.

Engineers Nominate

Nominations for officers of the American Society of Mechanical Engineers for 1940 were announced at a recent meeting of the national nominating committee held at State College, Pa. Election will be held by letter ballot of the entire membership, closing on Sept. 26, 1939. Nominees are as follows: President, WARREN H. MCBRYDE, consulting engineer, San Francisco; vice presidents, KENNETH H. CONDIT, executive assistant to president, National Industrial Conference board, New York; FRANCIS HODGKINSON, consulting mechanical engineer, New York; J. C. HUNSAKER, head of department of mechanical engineering, Massachusetts Institute of Technology, Cambridge, Mass.; K. M. IRWIN, assistant to vice president in charge of engineering, Philadelphia Electric Co., Philadelphia. Nominations for managers of the society are: J. W. ESHELMAN, president, Eshelman & Potter, Birmingham; LINN HELANDER, head of mechanical engineering department, Kansas State college, Manhattan, Kans.; G. T. SHOEMAKER, president, United Light & Power Service Co., Chicago.

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A Little Knowledge

(*Continued from page* 23)

full answer as to its causes, or at least its prevention.

Lest I seem to state this case unfairly, let me quote from a paper by the two men, Sims and Lillieqvist[1]; to whom goes much of the credit for finding the weak joint in the scaly armor of this dragon, aluminum embrittlement:

"In September, 1928, an acid electric furnace was put into operation at the Indiana Harbor plant of the American Steel Foundries. Following the usual practice, aluminum additions were made in order to obtain

Tab I

Chemical and Physical Properties of Converter Steel

Made by the Converter Process at Plant of Malleable Iron Fittings Co., Branford, Conn.

Date	Blow	C.	Si.	Mn.	S.	P.	T. S.	Y. P.	Ext.	% R. A.	Bend
12/31/08	555	.28	.33	.88	....	.045	73,500	45,000	31	48½	180
						...	73,500	47,000	31	49	180
1/5/09	556	.28	.21	.68	....	...	62,120	39,000	33	52½	...
1/5/09	558	.23	.30	.92	....	.046	71,000	42,500	32½	48½	180
						...	71,000	40,000	33½	47	180
1/13/09	565	.28	.30	.93	....	.038	73,500	42,500	29½	49	...
						...	74,100	40,000	31	46	180
1/22/09	575	.30	.32	1.08	....	.042	77,150	42,000	29	48½	180
						...	77,600	42,000	26	40	180
2/8/09	595	.25	.17	.59	....	...	63,750	31,500	33	48	...
2/15/09	606	.28	.25	.93	....	.042	68,900	38,650	34	55	...
						...	69,500	40,500	32½	55	180
						...	69,000	39,750	32½	52	180
2/25/09	617	...	...	...	....	...	74,900	48,000	30	49	...
3/5/09	627	.28	.30	.93	....	.050	69,500	38,500	30	46	180
						...	69,250	36,500	31	49	180
3/17/09	639	.28	.28	.87	....	.046	66,500	41,000	34	52	180
						...	66,500	40,000	33	49	180
3/19/09	642	.27	.31	1.04	....	.046	70,000	42,000	31	49	180
						...	70,500	41,500	31	52	180
3/24/09	647	.28	.28	1.00	....	.044	67,500	40,000	33½	55	180
						...	67,500	40,000	33½	53	180
4/14/09	668	...	...	...	....	.039	74,000	42,500	24	39	180
						...	71,800	42,250	29	48	...
						...	71,700	41,600	25	46	...
5/3/09	689	.28	.34	1.02	....	.046	75,000	42,000	29	49	180
						...	75,000	43,000	28	50	180
5/3/09	690	.27	.29	.95	....	.045	72,500	41,500	27	50½	180
						...	71,500	40,000	30	48	180
*	*	*	*	*	*	*	*	*	*	*	*
3/13/11	2,574	.26	.36	.82	.063	.047	70,950	40,950	29	49	...
						...	74,000	45,000	29	48	...
						...	71,500	45,500	30	50	120 OK
4/1/11	2,604	.26	.41	.94	.084	.045	71,350	38,400	28	46½	...
						...	71,000	41,000	29	50	...
						...	71,500	42,000	27	49	...
6/4/11	2,734	.25	.30	.63	.077	.049	75,050	36,750	27	49	...
						...	73,500	46,000	26	45	120 OK
6/18/11	2,737	.29	.40	1.02	.088	.054	74,500	44,500	30½	49	120 OK
						...	75,500	44,500	28	49	120 OK
6/20/11	2,740	.27	.37	.96	.101	.054	76,000	46,000	28½	45	120 OK
						...	75,500	46,800	27	46	120 OK
6/24/11	2,745	.25	.23	.64	.098	.047	69,500	45,000	30	43	120 OK
						...	68,000	41,000	28½	47	120 OK
6/26/11	2,751	.28	.37	.93	.105	.046	72,500	49,000	15	21	...
7/1/11	2,761	.28	.45	.98	.088	.050	80,500	53,500	27½	43	120 OK
						...	79,500	52,000	26	40	120 OK
7/3/11	2,764	.30	.40	1.14	.097	.047	81,500	48,500	26	38	120 OK
						...	81,500	47,000	26	39	120 OK
7/8/11	2,768	.29	.38	1.04	.088	.044	87,500	48,500	23	34	120 OK
						...	87,000	55,000	24	34	120 OK
7/10/11	2,773	.29	.57	1.02	.09	.045	84,000	53,500	25	36	120 OK
7/19/11	2,791	.27	.37	.54	.089	.051	86,000		24	41	120 OK
						...	85,000	54,000	22	35	...
						...	89,000	56,000	22	35	
						...	89,000	55,000	22	35	
7/29/11	2,811	.28	.54	.93	.064	.048	85,500	51,500	23	37	120 OK
						...	86,000	52,000	20	37	
						...	78,000	53,000	27	46	120 OK
*	*	*	*	*	*	*	*	*	*	*	*
4/18/13	3,437	.29	.29	.97	.084	.055	76,500	45,500	30	44	120 OK
						...	73,000	42,000	30	46	120 OK
4/25/13	3,454	.29	.33	.89	.066	.056	74,500	45,000	28	46	120 OK
						...	72,000	44,500	27½	51	120 OK
						...	72,500	44,000	29	48½	120 OK
4/28/13	3,461	.29	.27	.95	.069	.058	77,000	47,000	28	47	...
						...	74,000	42,500	29	47	...
						...	73,800	43,800	26	40	...
4/30/13	3,469	.30	.42	.93	....	.058	70,000	41,500	29	52	120 OK
						...	70,500	42,000	30	53	
5/5/13	3,478	.30	.44	.95	....	.055	72,000	42,500	29½	53	120 OK
						...	72,500	43,000	28	48	
5/9/13	3,491	.27	.26	.73	....	.059	81,000	48,500	28	48	120 OK
5/19/13	3,517	.29	.30	.75	....	.045	74,500	46,000	27½	52	120 OK
						...	76,500	48,000	27½	40	...
5/29/13	3,543	.29	.28	.96	.080	.056	75,500	43,000	26½	45½	120 OK
						...	77,000	45,500	26½	40	120 OK
						...	76,500	45,000	32½	45	120 OK
6/4/13	3,554	.30	.24	.92	.088	.051	72,500	43,500	30½	47	120 OK
						...	74,500	41,500	29	45	120 OK
						...	73,000	43,000	27	44½	120 OK
6/11/13	3,571	.29	.29	.93	.065	...	90,500	58,500	20	31½	90 OK
						...	80,500	47,500	22½	24	90 OK
6/20/13	3,591	.29	.31	1.02	.056	.046	77,000	44,500	26½	51	120 OK
						...	72,500	44,500	28	51	120 OK
						...	78,000	48,000	26	45	120 OK
6/27/13	3,603	.28	.24	.87	.064	.048	73,000	43,000	28½	49	120 OK
						...	73,500	43,000	25	32	120 OK
						...	74,500	43,000	31	50	120 OK
						...	78,000	45,500	21½	32	120 OK

sound castings. Immediately the problem of low ductility arose. Previous to that time, only open hearth steel was produced, and, aluminum being used rarely in that steel, there had been practically no trouble with low ductiiity in the lower carbon ranges."

It is not my intention here to go at length into the story of the long fight to overcome this devil latent in acid electric steel. That task is left to those more familiar with its details, from having carried the burden of the research and experimentation directed towards its solution. A few high points are pertinent to this discussion.

George Batty, who came to this country from England in 1927, said[2], in 1931;

"It is stated by a number of foundry superintendents who formerly operated in shops using the converter process for the production of metal, that converter metal did not give them pinhole trouble. However, the writer must affirm that, having examined a number of castings made in the converter era—retained as exhibits—definite evidence was found of fine pinhole penetration at internal angles of certain castings.

"Still, it must be conceded, in the light of general testimony, that the pinhole trouble became more apparent and much more of a menace to the production of light steel castings with the advent of electric furnace metal in its supersedence of the converter metal. In general, the expressed opinion indicated a belief that, for identical composition as revealed by conventional analysis, electric furnace metal had to be made hotter than converter metal to give equivalent ability to run light-section castings."

1—Sims and Lillieqvist, Transactions A.I.M.E., Vol. 100, 1932, page 154.

2—Geo. Batty, Transactions American Foundrymen's association, Vol. XXXIX, 1931, page 861.

Sand Deformation Is Measured

(*Concluded from page* 29)

seal coal or cereal flours.

Sands worked with a deficiency of bond sometimes are tempered with excess moisture. This is necessary to develop a safe deformation value and to make the sand workable. Excess moisture is responsible for blow holes and pin holes in the castings.

A clear, graphical picture of sand toughness is shown in Fig. 3. Rectangular areas show safe working limits for toughness of molding sand used for various types of castings. Where the toughness of the sand appears above the safe area, there is a greater tendency toward formation of scabs, buckles and blow holes in the castings. Conversely where the toughness falls below the areas the sand readily will cut, drop, peel and form rat tails.

Sand control in the foundry has developed to a high state of usefulness. Applications are broad in selecting a new sand and precise in maintaining a uniform working sand. Sand preparation is a problem in maintaining uniformity. It may be said that every variety of molding sand has at least a few desirable properties. Others are supplied through suitable additions. Undesirable properties may be controlled or reduced by various additions.

Mold bonding materials possess a wide range of plastic properties which influence the workability. Variation of this workability can be secured through changing any of the following variables: Type of bond, moisture, grain size, distribution, amount of mixing and tempering time. Sea coal and cereal binders are used in limited quantity to increase the safe workable range of molding sand. The molder should be supplied with a uniform, workable sand and this result can be secured by resilience control.

French Unveil Bust Of E. V. Ronceray

During the annual convention of the Association Technique de Fonderie, leading French foundrymen and a considerable number of members of the Association Technique de Fonderie met on the premises of the Ecole Superieure de Fonderie to unveil a bust in memory of E. V. Ronceray, past-president of the French association, one of the founders of the high school of foundry and the first director of the school, who died in December, 1938, after having devoted the greater part of his life to the foundry industry of France and also to the means of extending good relations and friendships among the various foundry associations of the world.

The bust was offered to the Ecole Superieure de Fonderie by the association of engineers who graduated from the school, and it was placed in the reception room of the school.

The principal speech was delivered by Prof. Albert Portevin, who succeeded E. V. Ronceray as director of the school of foundry. Professor Portevin recalled that at the first foundry congress, which was held in Liege, Belgium, after the war, in 1921, in which the French and Belgian associations participated, Mr. Ronceray contributed an address on the technical education and apprenticeship of young foundry students in which he explained what was being done in France at the time and what, in his own mind, remained to be done. Undoubtedly at that time Mr. Ronceray already had conceived in his mind the scheme of the high school of foundry.

In 1923, Mr. Ronceray was elected president of the committee of apprenticeship and education of the Syndicat General des Fondeurs de France, the French foundry employers' association, of which the president was then the late Charles Dufour. As a result of the activities of Mr. Dufour and Mr. Ronceray, supported by the efforts of Mr. Labbe, a French government official, director of Technical Education, the scheme of the school of foundry eventually materialized and was financed partly by the Syndicat General des Fondeurs and partly by the government, the school being opened in January, 1924.

At first, rooms and workshops were lent by the Ecole des Arts et Metiers, of Paris, and at a later date a complete block of the school was given over to the Ecole Superieure de Fonderie. Professor Portevin recalled that this was an entirely new venture, and a complete curriculum had to be thought out to meet the requirements of students coming partly from the works and partly from technical schools. This was achieved, thanks to the efforts of Mr. Ronceray and a number of his colleagues, who gave a considerable amount of time and thought to the scheme. From the beginning, Professor Portevin was in charge of the course of metallography applied to the foundry.

The school was a success from the start, and many past students already have obtained high positions in the foundry industry, while Professor Lemoine and Professor Delbart, who were among the first engineers to graduate from the school, have been in charge of some of the most important lectures since they left the school. Students are recruited not only from France, but come from various other countries.

In his address, Professor Portevin also recalled the many services that E. V. Ronceray rendered to the industry in other directions, especially with regard to the development of the Association Technique de Fonderie, and his personal relations with the technical associations of other countries—in particular with the American Foundrymen's association, to many members of which association Mr. Ronceray was known personally.

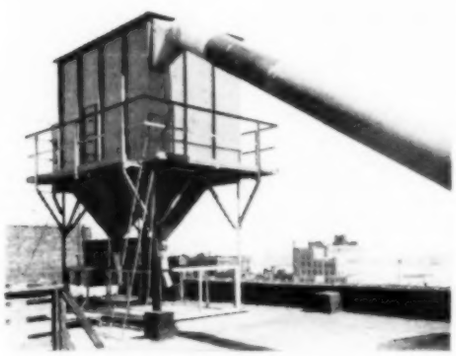
SLY DUST CONTROL

WILL SAVE YOU MONEY OR YOU CAN'T BUY IT!

★ ★ ★

Sly dust filter installation outside foundry, showing pipe connections from dust suppression sources on different operations inside.

The Sly cloth bag filter being removed from steel frame.



Sly dust filter unit installed on roof of foundry.

THE savings in using SLY Dust Control in the foundry industry come mainly from improved working conditions. The installation of a dust control system proves to the workers that the management is interested in their welfare. Better production and greater production naturally follow. As a typical user expresses it—

"We have recognized the value of dust control from the standpoint of good housekeeping and better relations with the workers employed in these departments. We have found that, when the workers recognize the desire of the management to provide them with clean, healthy working areas, they immediately show a greater interest in their work, and in maintaining the premises clean and the equipment in working order."

There's an abiding satisfaction in Sly Dust Control because it is engineered to the particular job. Established 65 years as *specialists* in foundry problems, we are proud of our ability to supply equipment that meets the exact requirements of the user. We can take full responsibility for the complete installation.

Each condition is carefully studied and analyzed before any recommendation is made. Only when we know beyond a question of a doubt that Sly Equipment will do a satisfactory job and save money will we recommend it. Otherwise you can't buy it.

Ask for "Guide to Dust Control."

THE W. W. SLY MANUFACTURING CO.
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Branch Offices in Principal Cities

BLAST CLEANING EQUIPMENT SLY TUMBLING MILLS
DUST CONTROL EQUIPMENT FOR EVERY INDUSTRIAL PURPOSE

Cast Soil Pipe

(*Continued from page* 26)

Pipe Co., Alexander City, Ala., constructed a small experimental foundry with the idea of making soil pipe centrifugally in sand lined molds. Some work in that connection previously had been done by Beatty and in the shops of the Rudisill Foundry Co., Anniston, Ala. The process of making hollow castings centrifugally is not new, but soil pipe, because of its thin wall section presents many interesting problems in that respect.

The process as developed at Alexander City consists of lining cylindrical flasks with sand, putting them into a machine, introducing molten iron and spinning the molds at a predetermined speed. Due to the action of centrifugal force which throws the molten metal away from the center of rotation and against the sides of the sand mold, the pipe is formed. The proper speed is determined by the laws which govern centrifugal forces. That is, centrifugal force is directly proportional to the square of the speed of rotation.

Flask Lined With Sand

To line the metal flask with sand it is placed vertically on a jolt ramming machine and after the pattern is centered into position, sand is introduced through apertures provided in the top centering plate. The jolt rammer, actuated by compressed air at 80 pounds pressure, packs the sand around the pipe pattern. This lining is from ¾ to 1 inch thick. Sand used is the same as is used for making cores in the other foundry.

The pattern is lowered and drawn by an ordinary geared drum-hoist, controlled by a switch convenient to the operator. The hub part of the pattern is fastened to the jolt table, and a joint is made at the end of the curvature of the hub. Flasks, as they are rammed, are held rigidly to the table by special air-actuated clamps. After a flask has been lined it is removed from the table by an air hoist suspended from a monorail. It is then sent to the blacking station. Here the inside sand wall receives a coat of carbonaceous solution mixed with a little liquid core binder. This is to prevent the sand from adhering to the casting and to give the pipe a clean smooth appearance.

The molds are placed horizontally on light rail runways, where blacking and sand are baked by a gas flame to drive out the moisture.

A hub core then is inserted on one end of the flask and bolted to flanges. On the other end a spigot plate is attached in the same manner. This plate is provided with a hole large enough to receive the pouring spout in which the molten metal is to be introduced after the flask reaches the spinning machine.

The spinning machine, shown in the accompanying illustration, consists of a bed frame, properly braced and with roller bearings which support four flanged wheels keyed to shafts. The flask, placed horizontally in the machine, rests on these four rollers, two of which are motor driven with V-belts. Two upper idler rollers are provided to give the spinning flask smooth operation and a minimum of vibration. They also serve as a safety device. Flasks are lifted in and ejected from the machine with two cams mounted on the same shaft and actuated by a hand lever located at the pouring end of the machine.

Weigh Molten Metal

After a flask is placed in the spinning machine and the top hold-down rollers lowered into position, molten iron is introduced through a special pouring spout. The exact amount of metal to make the pipe is determined by accurately weighing it. Thus, for single hub standard pipe, 35 pounds of metal are weighed out before it is poured into the mold. In making 4-inch standard pipe the molds are turned at a speed of 750 revolutions per minute. This gives an acting centrifugal force of approximately 1½ pounds per square inch.

In the spinning operation the molten metal solidifies in about one half minute, after which the flask is ejected from the machine. It then goes to the shakeout where the pipe and sand are removed from the flask by an air vibrator attached to the suspended flask. The pipe is sent to the cleaning shed where it is ground and dipped ready for shipment. The empty flask is returned to the ramming station to begin another cycle.

With this arrangement, which at best is rather crude, we get from 30 to 40 pipes per hour. Record output is 360 pipes per 8-hour day, an average of 45 pipes per hour.

Fig. 10—The sand lining of the mold is knocked out with every casting

Scrap Loss Is High

What are losses and costs? Losses are excessive. We have good days and bad days. Over the months of November and December last year foundry loss was 14.92 per cent. This is more than twice the loss usually experienced in the old way of making pipe. However, we have worked under a handicap in that the equipment is crude and has not had the proper maintenance care. There is no reason why the loss cannot be reduced to that of normal foundry practice. Cost for the operating period, November and December, 1938, was 69¼ cents per pipe. This figure reduced to a tonnage cost gives $39.54 per ton finished product. This figure of $39.54 per ton of finished product is obtained despite the fact that we operate on a very small scale with a high melting cost and the high percentage of foundry reject as stated. However, we saved 5¼ tons of metal during this period. By this I mean that we saved a little weight on each pipe produced, so that the accumulated savings amounted 5¼ tons. Every soil pipe foundryman knows that it is very difficult to make 4-inch standard pipe down to the weight of 35 pounds. We experience no trouble in making centrifugal pipe to weigh from 32 to 34 pounds.

Another advantage centrifugal pipe has over pipe cast the old way is the absence of gates. A set of 4-inch gates weigh approximately 7 pounds per pipe, which means that these must be melted and poured just the same as the metal required for the pipe. In other words, approximately 18 per cent of the melt for standard 4-inch soil pipes goes into gates. At a plant running nine floors we melted 33,229 pounds of gates. This represents a net loss of $166.16 on the pipe melt for gates alone. Reduced to cost per pipe, it costs 3 cents per pipe just to melt the gates and pour them.

So far centrifugal soil pipe has been subjected to rather limited tests, but it has shown remarkable characteristics. The iron is free of

(*Concluded on page* 74)

SURE YOU CAN MAKE GOOD CASTINGS WITH OTHER BONDING CLAYS, BUT

Tremendous green strength makes it *easier* to maintain bond and *easier* to cut costs. * High permeability makes it *easier* to avoid blows. * Moderate dry strength makes it *easier* to stop cracked castings—to have a quicker shake out—to have less flask abuse—to have lower sand loss—to have less lumpy sand—and it's *easier* to recondition your soft sand at the shake out. * High flowability and freedom from sticky, gummy sand makes for *easier* ramming—makes it easier to get good finish—makes it *easier* to use hot sand. * Low contraction makes it *easier* to avoid scabs and buckles.

There is a rumor around that running a foundry is no picnic at best — So — DON'T DO IT THE HARD WAY—TAKE IT *EASIER* BY USING

DIXIE BOND

The strongest bond clay of any type ever offered American foundrymen

EASTERN CLAY PRODUCTS, INC.

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(*Concluded from page 72*)

any slag inclusions and the wall sections are much more uniform than pipes cast the old way. A length of 4-inch single hub standard pipe weighing 32 pounds was put under a cold water pressure test of 950 pounds per square inch. There was not the slightest leak nor did the pipe fail at this high pressure. The plug caulked into the hub failed so that it was not possible to completely test the pipe to destruction.

Experience has shown that the most satisfactory metal for centrifugal casting of standard soil pipe shows the same analysis as that used in the main foundry, namely, high silicon, high carbon iron.

For this experimental foundry

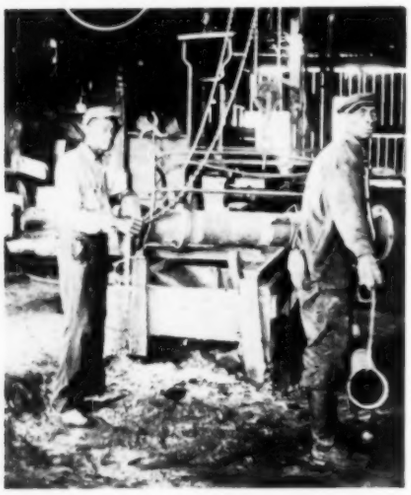

Fig. 11—After the sand has been removed the mold is returned to the ramming station

the metal is melted in an 18-inch cupola constructed a little differently from other furnaces. Air is supplied by a fan type blower mounted on brackets welded to the back side of the cupola. A little vibration transmitted from the fan to the cupola tends to prevent the charges from hanging. The wind pipes divide to form a *y* at the blower outlet and lead to opposite sides of the cupola and directly connect to the tuyeres. There is no wind box. The fan driven with a 5-horsepower motor and operating at 3250 revolutions per minute, delivers 585 cubic feet of free air per minute at 10 ounces pressure. The combined area of the continuous tuyeres is one eighth of the internal diameter of the cupola. Melting rate is 1500 pounds per hour. The cupola is slagged in front and the metal runs continuously from the time of wind-on in the morning until the bottom is dropped in the afternoon. The metal is caught and stored in a small tilting ladle of approximately the same capacity as a charge. Charges are 200 pounds of iron to 25 pounds of coke or a ratio of 8 to 1.

This article is from a paper presented before a meeting of the Birmingham Chapter of the A.F.A. The author Herbert H. Farr is connected with the Ferro-Spun Corp., Alexander City, Ala.—The Editors.

Safety Measures Pay Dividends

(*Concluded from page 31*)

exhaust hood over the shakeout moves 20,000 cubic feet of air per minute. Strange as it may seem the area once considered the greatest hazard from a dust exposure view point, now is no greater than any other part of the foundry.

The mechanical shakeout removes more sand from the castings than any hand method. Before the gates are removed the castings are pressure blasted. This serves two purposes: It saves the cutting tools and the grinders are not exposed to the dust from the sand. The grinding room is separated by a partition from the molding room.

All the molds are placed on roller conveyors. They can be shifted from the feeder roller lines to the main line by pulling a lever to raise the conveyor. The molds are not lifted by the operators. Metal is poured from two sides and when the metal has set the mold is rolled to the shakeout and raised by a pneumatic lift to a position for dropping on the vibrating screen. Sand falls through the screen on to a belt, then over a magnetic separator and into a bucket elevator which raises it to a paddle mixer 35 feet above the floor. The remainder of the required amount of water is added at this stage. The sand is conveyed to an aerating device which releases most of the steam and reduces the temperature. The sand then falls on to a long belt traveling over the open mouths of 12 hoppers. Plows which may be adjusted in any combination, divert the sand into any desired hopper over the molding machines. Capacity of the sand handling system is 15 tons per hour.

Light is supplied through a combination of incandescent and mercury arc vapor lamps which produce a minimum of 20 foot candles. Some supplementary lighting also is supplied. This ample light is an aid to better work and undoubtedly reduces fatigue and prevents accidents. Insistence is placed on proper protective clothing and equipment.

To determine the amount of dust in the atmosphere, settlings were allowed to accumulate for a period of a few weeks. Analysis of typical samples showed: Iron 30 per cent; copper 30 per cent; free silica 30 per cent; miscellaneous carbons 10 per cent.

Dust count is one of the methods used to measure improvements which affect the health of foundry workers. Counts are made with various instruments. Counts usually vary because they are affected to some extent by weather conditions, air movement, nature of work, humidity, methods of taking the samples, etc. The dust counter is used regularly for comparisons. The purpose is to recognize and note conditions which change continually and to make changes when necessary.

Authorities have not decided on standards for dust tolerances. In principle, safe allowances are estimated from 5 to 20 million particles per cubic foot, depending on the percentage of free silica. These figures are not accepted as standard, but represent a basis from which to work. Dangerous sizes are below 10 microns, according to medical authorities. The larger sizes do not affect a man because they do not enter the extremely small sacs in the lungs. The generally accepted system is to count the dust particles and then figure the percentage of free silica and the particle sizes.

For example if the count is 20 million and the dust contains 30 per cent free silica, the hazard would be considered as 6 million particles of free silica per cubic foot.

In addition to pre-employment physical examination, the foundrymen are given an annual examination which includes a chest x-ray. Up to the present the plant doctor has not found it necessary to change any of the men to other work. However, observations will be continued.

Shower baths are provided for the men, also pans of a solution to prevent athlete's foot. The men use these showers regularly every day. The floor of the shop is concrete and 15 minutes are allowed every day to clean up the shop. Locker rooms and individual lockers are located outside the foundry proper. The foreman wears a white shirt all day and it is still white when he goes home at night. A vacuum system is employed instead of a broom. Salt tablets are available.

Manufacturing costs have been reduced approximately 10 per cent. Capacity has been increased over 100 per cent. Cost of making the changes in the foundry amounted to $28,000 and was practically written off in one year. Better castings than could be purchased outside are obtained at a lower cost and there is no delay in deliveries. Scrap loss is approximately 1.00 per cent. The molder's burden is lightened since he has no shoveling and ramming.

ADVERTISING PAGES REMOVED

Nonferrous Alloys Available

(*Continued from page* 32)

to some extent the ultimate tensile strength, all other conditions being equal. It also increases elongation somewhat.

Study of the comparison between this series and that of the straight copper tins, *EE* to *OO* and comparison of their physical properties is quite enlightening as to the effect of the additions of lead and zinc and the consequent change in the physical properties listed but the bearing qualities also tend to change, which cannot be listed easily in any table. Since zinc combines with the copper, there is that much less copper that is unsatisfied by any other elements for combination with the tin. Consequently, where the same tin content is present and there is some zinc present, the tin ratio to the copper is higher, thus resulting in an increase in the amount of the delta constituent present in that composition in which some of the copper has been satisfied by zinc.

The consequent increase in the percentage of the delta tends to increase the bearing carrying capacity of the composition, all other things being equal. This, of course, is just a general statement and is not to be construed as a fundamental law because there are so many other conditions in connection with the success or failure of a bearing that to limit it to the one factor of the amount of the copper-tin delta constituent present, would not be an accurate statement.

Improved by Phosphorus

Use of phosphorus in these alloys in which zinc is a definite element, is not accepted generally as being good metallurgy. There are some who believe that copper-tin-zinc compositions may be improved by addition of a small percentage of phosphorus. There are others who condemn the use of both phosphorus and zinc in the same alloy. While research has not decided this debated question definitely, it seems to be accepted generally by those who make the compositions regularly that the two elements in any appreciable percentages are incompatible in the same composition.

Presence of both phosphorus and zinc tends to increase the drossy condition and in some cases is blamed for unsoundness or dirty looking castings. However, the compositions, like all of the copper-base alloys, must be deoxidized properly and must be free from gases, if the castings are to be sound and clean. All of the different compositions listed from *EE* to *ZZ* are free running alloys. When poured at the proper temperature, they are nice and fluid and fill the mold cavity accurately and most satisfactorily, developing sharp outline of patterns and flowing freely through gates and sprues. In other words, they are good casting alloys.

Compositions 1*AA* to 1*OO*, as shown on page 94 of the May issue and page 104 of the June issue, embrace a group of bronzes for bearing and other purposes that might be subdivided as 1*AA* to 1*II*, inclusive, as being leaded tin bronzes, and 1*JJ* to 1*OO* as high lead bronzes. However, all of them are more or less similar in their characteristics, in that they have a sufficient amount of lead to affect the physical characteristics as lead always does, namely the lead is distributed throughout the mass in small globules. Where much lead is present, of course, the globules sometimes are large and sometimes small, but when the bronze is well made and ideal conditions exist, the lead should be distributed throughout the mass in small microscopical globules, evenly dispersed throughout the section.

Lead Is Source of Weakness

These globules, if being alloyed with any other component, are sources of weakness in terms of tensile strength, in that the tensile strength of lead itself is low. Lead does form softer spots wherever globules exist that aid the bronze to be more conforming or more plastic, as it is sometimes called. Where the lead is present in large percentages, such as in compositions 1*LL* to 1*OO*, the compressive strength also is lower, since the softness of the lead tends to give under compression. Of course, where there is ample tin present, as in the case of the first of the series, the tin combines with the copper to form a hard or bearing crystal, known as the delta constituent, which helps to resist wear and to form a distinct improvement in bearing value, all other conditions being equal.

Where only a small percentage of tin is present, as in the cases of 1*MM* or 1*NN* or 1*OO*, there is probably no delta or hard bearing crystal present; but such compositions do have their field of usefulness in the hearing world where lubrication is interrupted or is not assured definitely and where a definite amount of conformability or plasticity is essential. It is interesting to study the entire series of leaded bronzes by comparing physical properties indicated in Table VI on page 104 of the June issue and by careful test of the variation in the physical characteristics by the change of the ratio of the three major components, copper, tin and lead.

Series 1*PP* to 1*TT*, shows an aluminum bronze group of alloys. The compositions listed are simply typical examples of a very wide variety of different compositions of those sold commercially under the trade name of aluminum bronze. These bronzes are in the high strength class of bronzes, strength being varied with the different compositions by reason of the varying quantities of the elements, iron, aluminum and manganese in different ratios with one another. Brinell hardness is somewhat proportional to the higher strength, but it will be noted that there is a wide range of ultimate tensile strength and yield point listed for each of these compositions. This is due to the fact that manufacturing methods influence these characteristics materially.

Ratio Is Important

Heat treatment will vary these characteristics definitely and is used regularly as a means of producing certain definite characteristics in cast parts produced in these alloys. Ratio of each of the hardening elements, iron, aluminum and manganese to the copper content, is an important factor and each manufacturer of aluminum bronze works out his preferred ratio of each of these different hardening elements to develop the precise characteristics desired. Of course it is axiomatic that certain minimum contents of the different elements must be present and certain maximum amounts of each will be found to affect the physical properties adversely. If the maximum tensile strength and maximum yield point are to be assured and at the same time a high elongation is desired, care must be exercised in selection of the ratios so that the hardening effect of any one of the elements may not reduce the elongation excessively, and yet the hardening affect is sufficient to insure the high ultimate strength and high yield point demanded.

Composition 1*QQ* has no iron or manganese, being strictly a copper-aluminum compound. This composition is frequently used where the heat treatment is to be practiced. Since the ratio of only two elements can be maintained more accurately than where a larger number than two is present, control of the chemical specifications can be maintained sufficiently to insure precision in the heat treatment. Heat treatment necessarily must be varied where the chemical content of the composition is varied so as to compensate for the difference in the physical

characteristics produced by the change in the chemical composition.

Composition 1*RR* is composition 1*QQ* plus the addition of 1 per cent iron. This makes a ternary compound which is relatively simple to control in its chemical composition so that accuracy is assured and thus heat treatment in this composition is accurate just as in the previously described composition 1*QQ*. Heat treatment is not difficult for those with metallurgical training.

Composition 1*SS* is an example of the aluminum bronzes in which the iron is well up and in consequence quite a good deal of the iron-aluminum compound is present, resulting in satisfying of much of the aluminum with iron. Thus there is not so much aluminum left to compound with the copper. This develops a condition whereby the copper-aluminum crystal is almost exclusively the alpha crystal and little, if any, of the second constituent results because of the low aluminum content. Thus this composition does not respond to heat treatment effectively. There is some change in the physical properties in this composition when heat treated but it is so insignificant that where cast parts are to be heat treated it is almost universally the commercial practice to use either alloy 1*QQ* or 1*RR*.

May Be Heat Treated

In composition 1*TT* the aluminum content has been raised as compared with that of 1*SS*, thus resulting in a composition in which there is considerable of the aluminum-copper present, in spite of the 4 per cent iron. Thus this composition may be heat treated; but since the hardening elements, iron and aluminum, are present in such large quantities, the composition is relatively hard, heat treated or not, and the elongation is much less than is the case with composition 1*SS*. It will be noted that the tensile strength of composition 1*SS* is somewhat higher than 1*RR*, and 1*TT* is still higher in this ultimate tensile strength.

Likewise the yield point is higher in 1*TT* than 1*SS*, but the yield point in 1*RR* is higher than in 1*SS*, indicating that the increase in the iron from 1 per cent to 3½ per cent has changed the ratio of yield point to ultimate. That is explained only by the fact that 1*RR* is capable of heat treatment, and therefore, its range of physical properties is proportionately affected by improvements available through heat treatment. In compositions 1*SS* and 1*TT* the chemical specifications indicate 0.5 per cent tin. This simply means the presence of tin up to that limit is permissible, although it should not be accepted as a necessary or demanded component of the alloy in the interest of improving its quality.

It should be noted that the four aluminum bronzes listed are simply typical analyses of four different types; variations from which quite readily are produced to meet specific demands of industry. Obviously manufacturers perfecting their manufacturing conditions for the production of a given composition may be better able to produce that particular composition than if they are called upon to make some radical change from their regular practice. It cannot be emphasized too strongly the fact that aluminum bronze is a composition that is extremely sensitive to methods of production, melting practice, molding practice, pouring practice, and all the myriad of minor operations that go to affect the complete production of cast parts in those alloys.

Good practice uniformly maintained up to the highest possible standard is the only sure way to get the best castings that will live up to the best physical properties for any of the aluminum bronze compositions that are produced regularly in industry. There are some other aluminum bronzes in which appreciable percentages of manganese are present and they have their field of usefulness and their peculiar problem of production.

This is the ninth of a series of articles by Mr. Patch on nonferrous alloys available to foundrymen. Previous articles have appeared in the January, February, March, April, May, June, July and August issues. The Editors

Reader's Comment

EDITOR'S NOTE — *Material Appearing Under this Head Does Not Necessarily Reflect the Opinion of The Foundry or of Its Editors.*

Remove Gas

TO THE EDITORS:

Recently published articles in the technical press dealing with methods for purifying iron and steel might convey the impression that the subject has not been explored previously. A description of the method which I developed many years ago was published in the Jan. 15, 1924, issue of THE FOUNDRY, page 77. Metal from the cupola spout fell through a perforated top into a receiver partly filled with glass cullet where it was purified and degasified.

In a recently described patented process, steel is deoxidized by pouring it through an acid slag. Some years ago Johnson in *Blast Furnace Practice* stated that pig iron is in an oxygenated state which follows through subsequent melting either in the cupola or open hearth. Cupola practice has to overcome certain features not discernible in the laboratory. We find mixing ladles, forehearths, hot blast, and odd types of melting units in some instances revolving while the metal is melting. In some cases the metal is jolted. In the centrifugal casting process some gas is thrown out. Nonmetallic inclusions are brought into more intimate contact with slag which absorbs and retains these inclusions.

In the Jones process, ways and means are brought into play to effect a full contact with the slag as acid to cover sources of trouble met with in operating the cupola. Moisture in the air causes hard iron and pin holes even where the chemical analysis of the iron is the same day after day. Cleaning the iron is just as essential as cleaning the materials used in cement construction. The sand and gravel may be washed and the cement may be of the highest quality, but if the mixing is not done properly the result will not be satisfactory. All iron contains gas. Liberation of this gas produces better steel and iron. It is claimed that several prominent steel makers are producing better steel by deoxidizing it through an acid slag. Obviously the same basic principle can be used to advantage with cast iron.

LLEWELLYN JONES
R. R. 4, *Box* 281
Richmond, Ind.

Book Review

You and Your Money, by C. Donald Dallas, cloth; 85 pages 5½ x 8½ inches; published by Prentice-Hall Inc., New York, and supplied through THE FOUNDRY for $1.50 and in Europe by the Penton Publishing Co., Ltd., London.

The author reviews the present economic situation in which we find ourselves and goes on to compare capitalism with communism and their effects on individual enterprise. The author then discusses capital and labor, including relationship in America as well as in England and Sweden. To make your money work for you, various types of investments are named and described and advice is given on buying and selling. Distribution of taxes is pointed out and the effect of redistribution of wealth by means of taxation is explained

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Make Perfect Cores

(*Concluded from page* 33)

the required green bond strength.

Many foundrymen fail to recognize the importance of using a definite ratio of oil to sand and then sticking to that ratio. It is a mystery how some foundries get along as well as they do when they fail to measure either oil or sand or, at best, just guess at the amounts. Foundrymen may pay especial attention to molding sand control or close analysis of the metal but show an utter disregard toward this all important point. The successful foundry sets up definite predetermined mixtures for various jobs and insists that a measured amount of oil is added to a measured amount of sand.

Considering all that has been said and written on the subject, one would imagine that every foundryman realizes the necessity of coating each grain of sand with oil. Despite a knowledge of the proper method many foundries mix sand by hand on the bench, on the floor with a shovel, or with some makeshift riddle arrangement. A mechanical mixer of the paddle or muller type easily will pay for itself in oil saved and uniformity of sand texture. Some foundries recognize the necessity of using mixers but pay no attention to mixing time or the proper routine of adding oil, water and cereal binder. Extended investigation definitely has proved there is a proper time limit. Usually that time limit is much less than one would imagine. Some tests of mixing time should be made to ascertain just where the tipover point occurs when core sand starts to lose its maximum tensile strength. This also applies to cereal binder addition.

Failure to recognize the importance of moisture control probably is responsible for more nonuniformity in cores than any one variable in core room operation. Lack of attention to that important item manifests itself in the following ways: *A*—Poor workability in the core box. Check the moisture content next time the core makers complain about cores sticking in the boxes. *B*—Slow drying in ovens. No oxidation possibly can take place until all moisture is driven from the cores. *C*—Cracks and split cores, if accompanied by temperatures that are too high or a baking cycle that is too quick. *D*—Haphazard ratios. Wet sand means less sand.

Foundries should start with dry sand to which should be added a predetermined amount of water. This is the only way to eliminate that variable. Lacking any definite moisture control, the moisture content of the core sand mixture should be kept between 3 per cent and a maximum of 5 per cent. In core blowing machines the moisture content of the sand should be kept down to 2 per cent for best results. These recommendations refer particularly to lake sands in common use in the Midwest, but experimentation can determine the proper moisture content of any sand.

When a woman bakes bread she does not put the dough in the oven and say, "There now—that's got to be out in 15 minutes." Yet some foundrymen seem to feel that they can spare only so much time for a certain core. The fact of the matter is, a core should not be rushed, nor should it be brought out of the oven just because it is the shape of the core. Cores pulled out of the oven with a nice, nut-brown color will give no trouble. Over baking results in cuts, washes and broken cores. Under baking produces blows and smoke.

Suggests Best Procedure

To bake cores properly and uniformly: *A*—Put a pyrometer on the ovens or wipe the dust off the pyrometer placed on the oven years ago but not used lately. *B*—Set a temperature of 400 degrees Fahr. and stick to it. *C*—Bake the cores at that temperature and remove them when they are nut-brown. *D*—Don't pull out a white-livered core. *E*—Don't leave a core in until it is black. This color indicates over oxidation and loss of film value. *F*—Get proper core ovens from a manufacturer who has put a lifetime of study on the subject. He will supply an oven that won't be filled with hot and cold spots, an oven that will not produce half dried or burned cores because the wind shifted to the west. *G*—Clean out the oven flues once in a while.

Surely it should not be necessary to mention this feature and yet it is overlooked every day. If there is any reason for putting a vent in a core, there is further reason for seeing that the vent passages are not stopped. See that cores are properly vented and then follow through into the foundry to see that the molders provide proper outlets. Make sure that coremaker and molder use vents of sufficient size.

Some coremakers seem to feel that their one job is to make cores, whereas the only function of a foundry is to produce good castings. If a core is no good, it should be thrown away. An exceptionally successful boss coremaker made the statement that a casting never should be lost on account of a core. His belief was predicated on core inspection and more inspection. This means additional labor cost, but without doubt it will pay big dividends. The great automotive and other specialty shops making millions of cores, actually operate their foundries with lower casting loss than many smaller shops and the answer is proper inspection.

Book Review

Modern Blast Cleaning and Ventilation, by C. A. Reams; cloth, 213 pages, 6 x 9 inches; published by the Penton Publishing Co., and supplied by THE FOUNDRY, Cleveland, for $4.00, and in Europe by the Penton Publishing Co. Ltd., London.

The author sets forth that blast cleaning today is an outgrowth of the crude methods of a few years ago, and that the process as carried out according to present day methods is of vital importance to those interested in production in foundries and various metal working plants where economical cleaning methods are imperative. The present volume is the first of its kind covering the entire field of blast cleaning and its necessary equipment.

The author writes from practical experience and has relied on actual blast cleaning operations as performed in modern plants for his subject matter. Latest developments in air and centrifugal wheel blasting are illustrated and described. The subject of adequate ventilation without which blast cleaning would be impossible on a sanitary basis is treated exhaustively.

The author divides his book into 35 chapters with 39 illustrations and 28 tables. The tables are a valuable addition as they contain data not otherwise available in convenient form. While the book impresses the reader as being a practical work from cover to cover the theoretical side has not been neglected as numerous formulas are given.

An appendix is included which contains some interesting blast cleaning "don'ts," a list of uses for blast cleaning equipment, a glossary of blast cleaning terms and a table of fan efficiency curves.

Autumn meeting of the Iron and Steel institute (of Great Britain) will be held in Cardiff, at the South Wales Institute of Engineers, Park place, from Sept. 12 to 15, a program of technical meetings, works visits, excursions and entertainments having been arranged in connection therewith.

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FOUNDRY DEVELOPMENTS AT SHORT RANGE

A MIDDLEWESTERN foundry patches its cupola entirely with a plastic refractory. The plastic is composed of three parts by volume of white silica sand with a high fusion point, and two parts by volume of high fusion point fireclay. The material is mixed in a pug mill since hand mixing is not satisfactory. Water is added during mixing, and about 14 to 15 per cent is used so that the mixture will possess the necessary stickiness, and still not be too stiff to work.

* * *

Addition of ferromanganese and copper to white cast iron produces a heat treatable material which shows high physical properties, according to a recent patent. Composition limits indicated call for 1.90 to 3.00 per cent carbon, 1.30 to 0.60 per cent silicon, 0.65 to 1.10 per cent manganese, 0.50 to 1.50 per cent copper. Heat treated at 1725 degrees Fahr. for 10 to 35 hours, quenched in air, oil or water, reheated to 1270 degrees for 10 to 35 hours, after which the temperature is increased to 1360 degrees for 2½ to 7½ hours, and then slowly cooled, the iron shows a tensile strength of 67,500 to 110,000 pounds per square inch, a yield point of 47,500 to 65,000 pounds per square inch, an elongation of 18 to 12 per cent, and a brinell hardness of 170 to 220.

* * *

An Eastern firm has developed an electrical device which will enable unskilled workers to detect flaws in machinery in operation. The instrument measures the intensity of sound at any preselected pitch, and turns a deaf ear to all other factory noises. Any variation from normal sound frequency intensities, are indicated by a dial.

* * *

While crucible life depends greatly on foundry practice, such as annealing, loading, handling, etc., it is claimed that the number of heats which may be obtained from the crucible may be increased materially with the use of gas fuel, due to a low thermal head, less heat input and the application of more than one burner per furnace. In one instance a furnace equipped with a single burner resulted in a crucible life of 30 heats, while an identical furnace in the same plant equipped with four burners lengthened the crucible life to 80 heats.

* * *

A special flux which is claimed to be beneficial in production of aluminum bronze is composed of 4 parts of manganese sulphate and 1 part of powdered magnesium. The mixture is added to the bronze in amounts of approximately 0.05 per cent by use of an inverted plunger or cup which is forced well below the surface of the molten metal.

* * *

BLUE color on brass may be obtained by immersing the object in a heated bath containing 124 grams of sodium thiosulphate and 38 grams of lead acetate per liter. In making the solution the thiosulphate and acetate each are dissolved separately in ½-liter of water, and mixed together just before use. Temperature should be about 60 degrees Cent. (140 degrees Fahr.) A yellow-gold color first develops followed by the blue in ½-minute.

* * *

Extermination of insects often is a problem in many plants, and necessitates a constant and active campaign to keep them under control. However, it is claimed that a recently developed insecticide reduces the work to a minimum. The material, an odorless powder, is said to be nonpoisonous, and contains 90 per cent active ingredients. It is claimed that the insecticide taken by full grown insects is carried into the nest which destroys the larva and spraying once a year is all that is required.

* * *

A manufacturer of electrical motors in the Far West now is supplying its motors with the bearings arranged so that the lubricant may be changed easily and simply. The bearing has an opening at the top on one end, and another at the bottom on the opposite end. New lubricant forced into the top opening pushes the old ahead of it out of the bottom opening. When the clean lubricant appears, the operator knows that the old material has been flushed out, and replaces the screw plugs in the openings.

* * *

TUNGSTEN-GRAPHITE thermocouple for obtaining temperature readings by immersion is said to give accurate results with an immersion of less than 70 seconds. The couple is comprised of a tungsten rod 1/10-inch in diameter.

* * *

Experience indicates that if cast iron drawing dies are polished with the strokes in the direction parallel to that in which the sheet moves over the drawing radii, a better surface may be obtained on the drawn product, and the difficulty of maintaining a continuous film of lubricant is lessened appreciably. In many instances the extra cost involved in polishing radii in the proper direction is well worthwhile.

* * *

An English writer states that a silica wash or paint for dry sand work may be made from 20 pounds of silica flour, ½-pound of bentonite, 1½ pounds of core cream, and 2 gallons of water. That mixture is suitable for spraying, and if desired for brushing, the water content should be reduced to give the required consistency.

* * *

Compo or "Sheffield compo" used in Great Britain for molding heavy steel castings is a synthetic molding mixture composed of old crucible clay pots, old firebricks, Sheffield ganister and fireclay all milled together with some carbonaceous material as coke or graphite often being added. However, scarcity of old crucible clay pots has led to the substitution of chamotte or calcined bauxitic clay for that material with excellent results.

ABSTRACTS .....

FROM WORLD LITERATURE

Cupola Control

Cupola Control, by H. P. Hughes, *Foundry Trade Journal*, London, England, May 18, 1939.

Best results can be obtained from the cupola only when every section of the practice is controlled properly, according to the author. He gives a detailed account on both theoretical and practical operating phases. The article describes preparation of the bed, charging, air supply, blast pressure, tuyere ratio, air volume, combustion, fuel, control of pig iron and scrap, limestone, changes in the cupola, sulphur, silicon, phosphorus, and oxidation.

Enamel Cast Iron

Cast Iron for Enameling (Ueber Emaillegusseisen), by Karl Emmel, *Die Giesserei*, Duesseldorf, Germany, May 31, 1939.

In this article the author has in mind various types of castings which must be enameled for use in the chemical and food industries, and which weigh up to 7 tons with walls approximately 1-inch thick. Examination of the microstructure of a 6½-ton kettle operated continuously with the highest temperature change of 212 degrees Fahr. showed almost pure ferrite. Further investigation of several different types of irons confirmed the fact that ferritic structures enameled best. Four test bars were subjected to heating and cooling cycles (10 hours at 1560 degrees Fahr.) 8 times. Two bars made in cupola had ferritic structure, showed growths of 8.25 and 9.00 per cent at end of 8 cycles, but enameled satisfactorily. The other two bars made by duplexing, showed growths of 3.25 and 4.47 per cent, but could not be enameled.

Foundry Practice

Nonferrous Foundry Practice, by J. Laing and R. T. Rolfe, *The Metal Industry*, London, England, May 12, 1939.

This article is section XXIII of a series, and relates to aluminum alloys. It discusses the 12.5 to 14.5 per cent zinc-2.5 to 3.0 per cent copper alloy. Copper-aluminum, silicon-copper-aluminum, heat treatable copper-aluminum, and heat treatable high copper-aluminum alloys. Information is given in the form of tables on physical properties and compositions of the various alloys.

High Conductivity

High Conductivity Copper Castings, by A. B. Kinzel, *The Metal Industry*, London, England, May 19, 1939.

While the author reviews a number of binary and ternary copper alloys which possess high strength and high conductivity, the discussion centers mainly around a copper alloy containing 0.08 per cent silicon and 0.80 per cent chromium. To obtain maximum properties the alloy is heated to 925 degrees Cent. for 2 hours, followed by a water quench, then reheating to 500 degrees Fahr. for 1 hour or more with furnace cooling. Conductivity is 85 per cent or more, yield strength 35,000 pounds per square inch, tensile strength 52,000 pounds per square inch, elongation 13 per cent, and brinell hardness about 100. Information is given on melting practice, and fields of use.

Aluminum Alloys

Nonferrous Foundry Practice, by J. Laing and R. T. Rolfe, *The Metal Industry*, London, England, May 19, 1939.

Constituting section XXIV of a series of articles on the subject of nonferrous foundry practice, this article continues the discussion of aluminum alloys. It carries further the information on heat treatable copper-aluminum alloys describing the effect of varying heat treatment, heat treatment of the Y-alloy, and discusses the constitution of that alloy. The article closes with information on aluminum alloys containing silicon and iron.

Wear Resistance

Wear Resisting Alloys, by J. E. Hurst, *Foundry Trade Journal*, London, England, April 20, 1939.

This discussion is confined to one type of alloy iron containing approximately 4.5 per cent nickel, and 1.5 per cent chromium. Hurst describes some investigations on variations in elements which change the characteristics of the alloy. Increase of nickel to 6.14 per cent, and chromium to 2.28 per cent resulted in an austenitic structure with a much lower brinell hardness number. Increase of manganese from 0.38 per cent on the 4.5 per cent nickel-1.5 per cent chromium alloy to 1.10 per cent decreased hardness considerably also. However, with manganese the breaking strength decreased in addition to reduction of hardness while with increase of nickel and chromium, the breaking strength increased considerably. The author also presents data on heat treatment for control of hardness.

Light Castings

Manufacture of Very Light Engineering Castings, by A. Burgess, *Foundry Trade Journal*, London, England, April 13, 1939.

This article gives interesting information in a brief concise manner on production of a number of different types of castings for engineering purposes. Specific castings discussed include a small diesel engine head, water cooled manifold, air cooled cylinder, electric motor casing, two-stroke cylinder for a gasoline engine, etc. The author also discusses pattern plates, follow boards, and 3 part molding.

Electric Furnace

Application of the Arc Furnace to Production of Gray Cast Iron (Die Verwendung des Lichtbogenofen zur Herstellung von Grauguss), by Gustav Sper, *Die Giesserei*, Duesseldorf, Germany, May 19, 1939.

In introducing his subject the author cites numerous advantages of the electric arc furnace, and then discusses phases such as graphite and carbon electrodes, electric and thermal efficiencies, duplexing, chemical reactions in the basic furnace, strength properties of electrically melted gray iron, economy of duplex process, etc. He also describes production of special iron from iron and steel borings, cost determinations, and deoxidation with calcium-silicon.

Scab Formation

Modern Sand Testing, by William Y. Buchanan, *Foundry Trade Journal*, London, England, May 11, 1939.

While a considerable part of the article is devoted to a description of sand testing, the main theme is an investigation to determine the cause of scab formation on gray iron castings. After trying several procedures the author concludes that expansion of the sand does not cause scabbing. Further investigation with a specially designed mold leads him to the conclusion that formation of scabs depends on relationship of dry strength, permeability and moisture content which he expresses as a formula: Dry strength times permeability divided by moisture.

Machine Parts

A Few Observations by a User Regarding the Respective Merits of Casting and Welding in the Manufacture of Machine Parts. (Quelques observations d'un usager sur les merites respectifs de la fonderie et de la soudure pour la realisation des pieces de machines), by P. Dubertret, *Bulletin* Association technique de Fonderie, Paris, April, 1939.

The author is chief engineer of the Compaignie Electro-Mecanique, manufacturing among other numerous items: Steam turbines, turbine auxiliaries, air compressors, reduction gearing, turbo-alternators, diesel engines, direct and alternating current motors and generators, transformers, electric switch gear etc. Castings and also parts fabricated by welding are used and the author states his views regarding the factors which are considered in deciding on one or the other method of manufacture. Among some of the factors are weight, soundness of the parts and delivery.

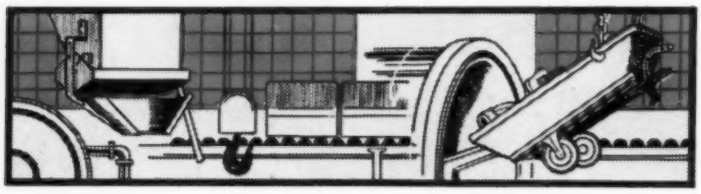
Carbon Control

New Cupola for Producing Controlled Carbon Content, by Mario Olivio, *Foundry Trade Journal*, London, England, April 13, 1939.

This article describes a series of tests conducted on a cupola to determine effect of variation of blast, and of position and dimensions of tuyeres. Illustrations are presented to show the results. Then brief descriptions are given of recent methods for hot blast operation.

Remainder of the article is devoted to a short description of a cupola developed by the author which incorporates an independent wind belt containing heating elements, which draw the heat from below the melting zone, and the two rows of tuyeres. Two heating zones are located between the two rows of tuyeres. Each tuyere has a regulator for controlling admission of blast which may be heated from 90 to 450 degrees Fahr.

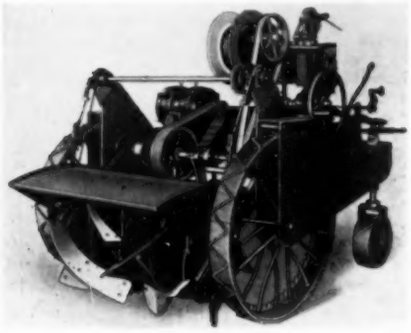
NEW EQUIPMENT . . .



AND SUPPLIES

Sand Cutter

American Foundry Equipment Co., 555 Byrkit street, Mishawaka, Ind., has developed a small size sand cutter shown in the accompanying illustration, and designed to meet requirements of small and medium size foundries with light or moderately heavy floors. It is claimed the machine is compact in design, light in weight and ruggedly constructed. Soft floors and close working quarters offer no obstacles to successful operation. Maximum maneuverability is obtained through special control and steering arrangement. The machine is built in two standard sizes with cutting cylinders 45 and 50 inches in length. It is powered with two electric motors, one for operating the cutting cylinder, the other for ground travel.



Tablet Dispenser

Davis Emergency Equipment Co., 55 Van Dam street, New York, has developed a new dispenser for supplying workers exposed to high temperatures with salt tablets to prevent sickness. The dispenser is made of black plastic which is chemically inert to salt. When a knob at the bottom is turned in either direction, a single tablet is dropped into the palm of the hand. The dispenser may be mounted near the drinking fountain so that workers can take the tablets with their drinking water. Two sizes are available, one holding 1000 tablets and the other holding 500.

Safety Siphon

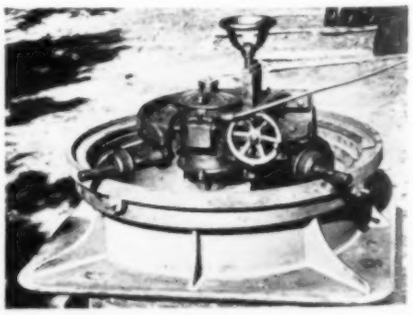
Pulmosan Equipment Corp., 180 Johnson street, Brooklyn, N. Y., has developed a safety siphon, shown in the accompanying illustration, and described as a safe, simple and efficient device for discharging the contents of carboys, drums and barrels.

Siphon consists of a special acid-resistance tube attached to a priming bulb, visual priming chamber, special composition flexible hose and a flow control valve. Once the siphon is inserted, the flow valve is closed and the priming valve flexed until liquid shows in the chamber. By adjusting the control valve a regulated flow of liquid from a trickle to 6 gallons per minute may be delivered. Flow is automatic. One man operates the siphon which works on the vacuum principle, eliminating the pressure method. It is claimed the siphon minimizes danger of fumes, burns, spilling and splashing and to discharge completely without tilting the container. The device is available for every type acid and container.

Special Grinder

Every foundryman who has had experience with the manufacture of municipal castings, particularly manhole frames and covers, is familiar with certain forms of trouble incident to covers which tip and wabble instead of fitting smoothly and accurately in their seats. Confronted early in his career as a foundryman with this problem, C. H. Lyne, C. H. Lyne Foundry & Machine Co., Miami, Fla., designed and built a special machine for grinding the bearing seats to a true fit. Later he built duplicate machines for other companies and now is prepared to supply machines to firms which may be interested.

In addition to grinding man hole rings and covers the machine, shown in the accompanying illustration, will machine catch basins regardless of shape or weight that have a circular opening within range of the machine, which is 20 to 30 inches cover diameter. Among other odd shapes the maker has machined a half round catch basin with a 24-inch diameter cover and 72 inches in length on the straight side. Extension arms projecting from the sides of the device permit operation over a wide range of sizes. Where the cover patterns warp, either wood or metal, they are placed on the machine and restored to accuracy. In the illustration the machine is shown mounted on a man hole with a 37-inch cover diameter and with a square base 48 x 48 inches.



– you would normally have to readjust your basic composition or make radical changes in your established molding and casting practice.
– but, such changes are always difficult and frequently impractical.

You know how changes in your basic practice would disturb your yield ratio of good castings per melt — with a consequent increase in costs.

NOW with V FOUNDRY ALLOYS

You can secure...WITHOUT CHANGE IN YOUR BASIC PRACTICE...

- A material reduction in chill
- Equalization of hardness between light and heavy sections
- Increased machineability

V-5 and V-7 alloys are chromium alloys balanced with manganese and silicon. They can be used with any type of gray iron . . . *without change in your basic practice.*

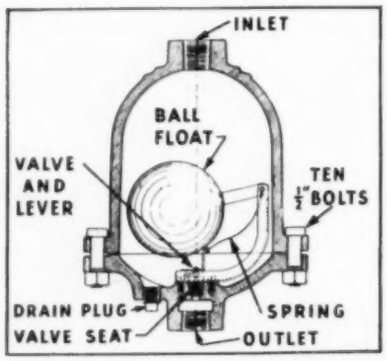
You can secure all the advantages of V-5 and V-7 alloys with little or no increase in your present costs.

If you are not using V Foundry Alloys or have not previously asked for specific recommendations, write for complete information.

VANADIUM CORPORATION OF AMERICA
420 LEXINGTON AVENUE, NEW YORK, U. S. A.

Air Trap

Armstrong Machine Works, 827 Maple street, Three Rivers, Mich., recently has developed a new snap action mechanical trap, shown in

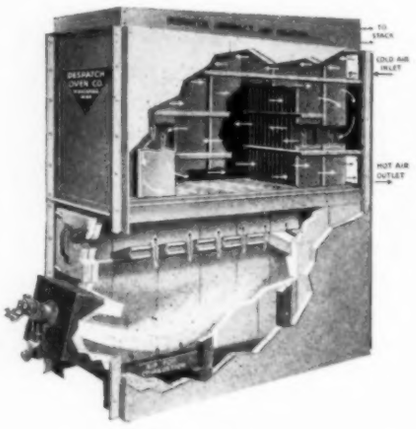


the accompanying illustration, and designed for draining water from compressed air lines, tanks, separators and after coolers. Principal advantages claimed for the device are immunity to dirt troubles, ability to discharge water without loss of air, positive opening and closing of discharge valve and freedom from need for priming. The trap has a ball float connected to a short valve lever through a flat strip of stainless spring steel. In the closed position, this spring is bowed downward. As water enters the body of the trap the ball float rises to bend and store energy in the spring. Just before the ball reaches the top of the trap the spring bends past dead center and the stored up energy snaps the valve wide open. In this position the spring is bowed upward. As the water level drops in the trap body the cycle is reversed and the valve snaps shut. Capacity claimed by the maker is 1400 pounds of water per hour at 125 pounds pressure and 1000 pounds per hour at 250 pounds pressure.

Air Heater

Despatch Oven Co., Minneapolis, Minn., recently introduced an indirect air heater, shown in the accompanying illustration, and designed primarily for space heating in foundries or other establishments. Whether oil or gas fired, the unit can be used for industrial ovens and dryers. Delivery temperatures, if desired, may be secured up to 1000 degrees Fahr. It is claimed that the new heater incorporates many new features that practically eliminate maintenance and replacement of parts.

The heat exchanger is arranged with a heavy duty alloy cast protection plate that shields the tubes in the heat exchanger from the radiant heat of the combustion chamber. The heat exchanger carries 88 individual tubes staggered to produce the greatest wiping action of the air. Only one burner is required on a 500,000 B.t.u. rating. Burner equipment, a low pressure proportioning type, keeps a constant ratio between the air and the fuel, either gas or oil. It is stated this not only promotes high efficiency, but eliminates soot and dirt which reduce maintenance of cleaning heat exchanger to a minimum.



Arrangement of the combustion chamber prevents flame impingement on the metal parts.

Parting

Agicide Laboratories, 4668 North Teutonia, Milwaukee, and 4549 Bandini boulevard, Los Angeles, recently has introduced a foundry parting which has as a base, English walnut shells pulverized to a predetermined fineness and graded for uniformity. The pulverized shells are treated to make each grain impervious to moisture.

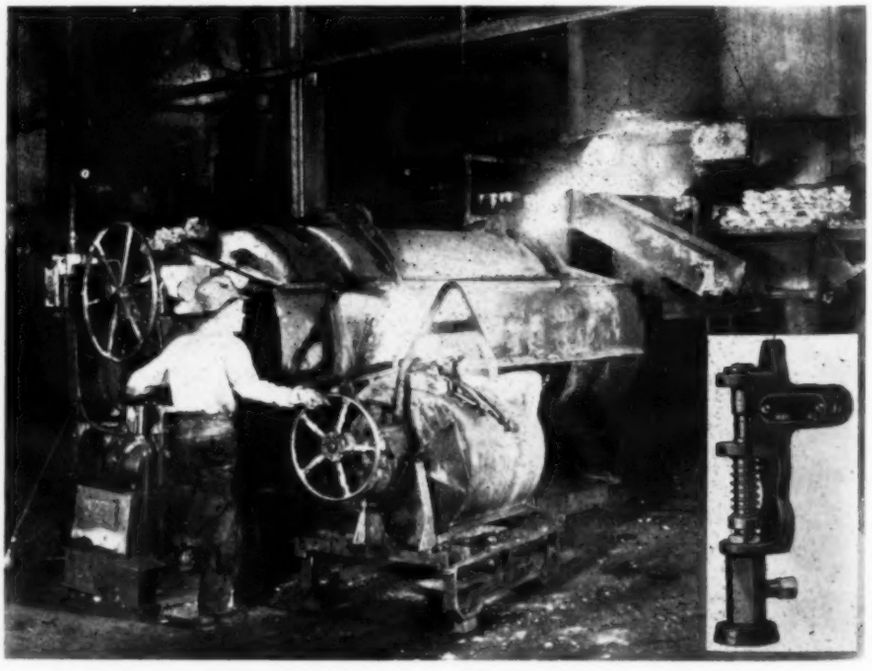
Each grain is a spherical shaped particle of vegetable matter. It is light in weight and due to the spherical shape, it is claimed the grains fall evenly when shaken on the mold or core box. The parting burns when the molten metal comes in contact. It is claimed this results in no surface abrasion and eliminates residue which may close up the sand.

Porcelain Enamel

Porcelain Enamel & Mfg. Co., Baltimore, Md., is marketing a new one coat, one fire, brown porcelain enamel finish. After drying, the brown coat may be grained in the bisque and fired at one time. It is said to be especially desirable where lighter gage metals are used, as the firing temperature is much lower than that ordinarily maintained to obtain a good bond. It is claimed to cover uniformly and has a good glossy finish.

Ladle Lubrication

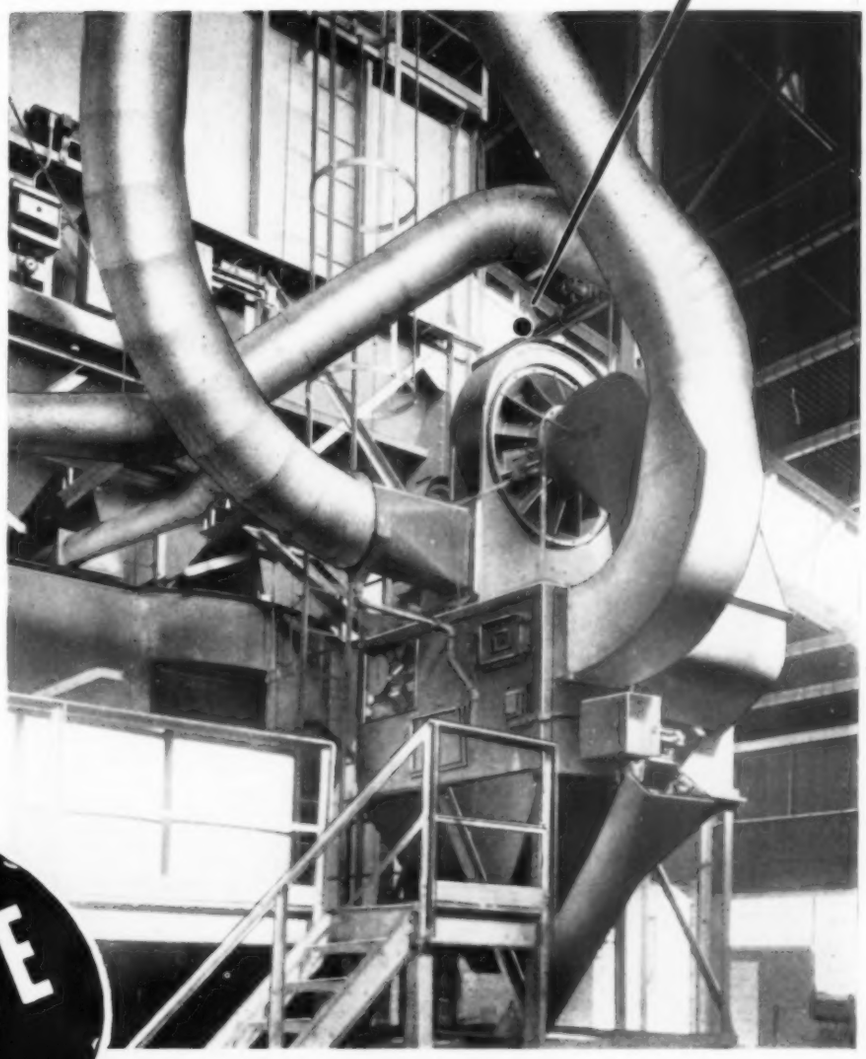
Modern Equipment Co., Port Washington, Wis., recently has applied an automatic lubricating system to its covered and insulated mixing ladles. The lubricating system is produced by the Bijur Lubricating Corp. A continuous type lubricator pump is installed in the worm gear housing and is driven by a cam rod actuating a toggle arm on the pump. A single oil distribution line feeds oil in predetermined quantities to the worm continuously during operation of the tilting mechanism.



Roto-Clone installations are COMPACT

Foundry floor space is usually at a premium—that is one reason why the Type W Roto-Clone has so completely met the needs of Foundry Engineers. ***Roto-Clone is Compact***—self contained—and may be installed entirely in overhead space if necessary.

Foundries throughout the country have found that the Roto-Clone provides a complete solution to their dust problems including sand handling, conditioning, screens, mullers, tumbling mills, sand blast, shakeout and grinders. Write to Dept. 217 for complete engineering data and Bulletin No. 276.

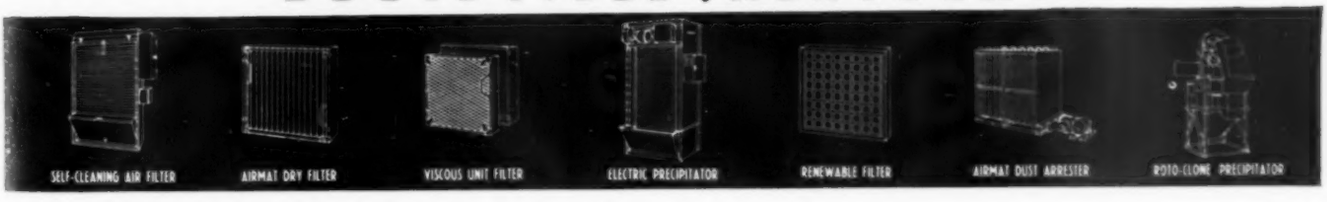


A Type W Roto-Clone serving shakeout and sand conditioning equipment in a large mid-western malleable iron foundry.

ROTO-CLONE
WATER SPRAY
DYNAMIC PRECIPITATOR

AMERICAN AIR FILTER CO., INC.

INCORPORATED
LOUISVILLE, KENTUCKY



Portable X-Ray

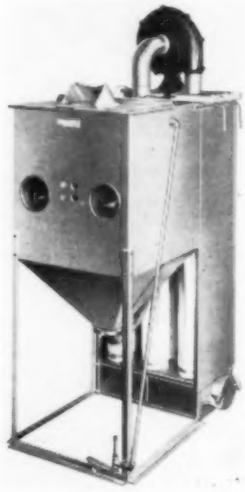
A 220-kv portable x-ray flaw detector recently was placed in service by the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. for welds and heavy castings on production lines. The technique of radiographic diagnosis of large steel parts is expected to be much simplified by this 4500-pound portable x-ray camera, since it may be wheeled along production lines.

Shockproof, completely self-contained, ready for work wherever there is a proper power supply, it generates x-rays with a penetrating quality sufficient for them to pass through 3 inches of solid steel. Focusing mechanism on the new equipment is extremely flexible, so that the apparatus may be aimed at a weld or casting in either a horizontal or vertical position.

Blasting Cabinet

Ruemelin Mfg. Co., 3860 North Palmer street, Milwaukee, recently has developed a utility abrasive blast cabinet which may be employed for cleaning small brass and aluminum castings. The cabinet, which is shown in the accompanying illustration, is constructed durably of steel. It is 20 inches square and stands at a height for convenient operation. Observation while blasting is obtained through a sight screen on top of the cabinet. Cabinet is loaded through a door in the top, and blasting is controlled by a foot operated air valve.

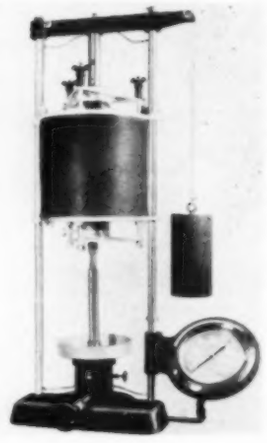
Operator's hands are protected by a pair of heavy rubber gloves attached to the cabinet. Blasting gun is equipped regularly with interchangeable 5/64 or 3/32-inch air jets consuming from 7 to 11 cubic feet of air per minute. Recommended air pressure is about 100 pounds per square inch. The cabinet may be equipped with a dust filter and fan as shown at the back of the illustration. The filter is provided with a bag shaking device and a cleanout door for removal of accumulated dust. Fan is direct connected to 1/10 horsepower motor, alternating current, single phase, 110 volts.



Dilatometer

Harry W. Dietert Co., 9330 Roselawn avenue, Detroit, has developed the dilatometer, shown in the accompanying illustration, for measuring behavior of molding and refractory materials at high temperatures.

(*Concluded on page* 92)



RESULTS are GUARANTEED!

you take no chances in Baking Cores with

MAEHLER CORE OVENS and HEATERS

Here is why—

- All types of cores, large and small, thin and heavy section, can be baked at the same time—perfectly.
- Baking time reduced from 40% to 60%. More loads handled per day at much less cost per bake.
- Recirculated heat means absolutely even baking of all cores — no guesswork — no mistakes. Stack losses are low. Efficiencies are high. Hence we have shown again and again that we can burn the better fuels, with less overall baking cost.
- Oven temperatures are under automatic control at all times, maintained within 10 F. Once started the oven tends itself —it's foolproof—no fear of under heat or over heat.

MAEHLER ovens, Core Oven Heating Systems and Heaters are used by leaders in industry ***because they deliver positive results!***

A Maehler Engineer will help you select proper equipment for your problem—or show you how your present ovens can be improved with a Maehler Air-Heat System. Write for details today.

THE PAUL MAEHLER COMPANY, 2200 W. Lake St., Chicago, Ill.

ATTENTION SAND SLINGER USERS

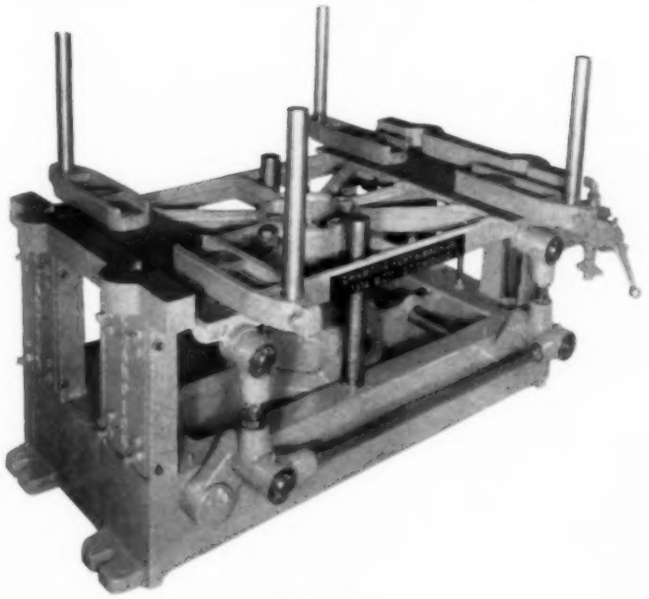


FIG. 1

Champion Power Strippers or Flask Lift Machines can be furnished in all sizes and types. Fig. 1 shows machine with lifting post adjustable in both length and width. Fig. 2 shows machine with post adjustment in width only. Fig. 3 has fixed lifting brackets for stripping plate equipment. We manufacture a complete line of Hand Stripping Plate Machines in all sizes.

Accurate and dependable stripping plate or flask lift (push-off) equipment is essential to get the best results from your Sand Slinger. Don't slow up production with make-shift pattern draw equipment. Your Sand Slinger is only as fast as the pattern or mold can be drawn and taken away. Champion Strippers and Flask Lift Machines are recognized as the most efficient and dependable for this important operation.

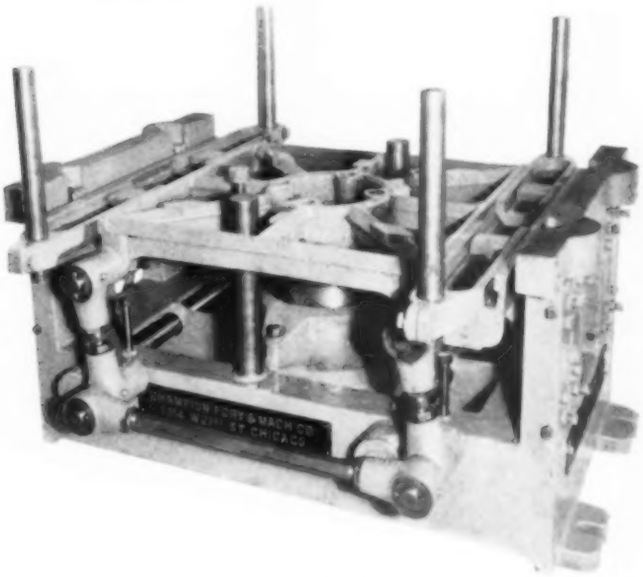


FIG. 2

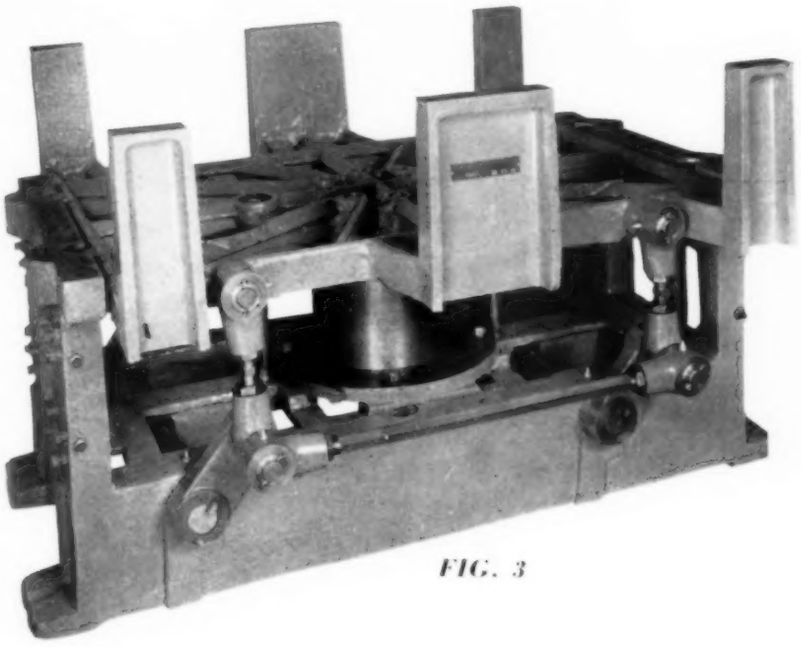


FIG. 3

Champion Power Strippers are built sturdy for dependable continuous service. Hardened and ground steel pins and bushings in all connections, cranks and connecting rods. Power is applied directly to center of load with no strain on working parts. Crank arrangement acts as equalizers insuring an accurate draw or lift. Lifting yoke is of cast steel.

Get Complete Details

Manufactured in Canada by John T. Hepburn Limited, Toronto

CHAMPION FOUNDRY and MACHINE CO.

1314 West 21st Street - - - - - - - - Chicago, Ill.

(*Concluded from page* 90)

It is claimed that expansion, contraction, hot strength, hot deformation and rate of collapsibility of molding sands, clays, cores and other refractory materials readily may be determined.

The device consists of three essential parts, a base containing a hydraulic loading mechanism, a furnace which readily may be moved up and down on two vertical posts, and an electric control unit, not shown in the illustration. The furnace is well insulated and may be brought up to a temperature of 3000 degrees Fahr., in approximately 45 minutes. Specifications include: Net weight 1200 pounds, shipping weight 1500 pounds, height 66 inches, base 18 x 23 inches, current 5 kilovolt amperes alternating current 220 volt, temperature range 500 to 3000 degrees Fahr., strength range 0 to 1000 pounds per square inch, furnace inside diameter 2 inches, furnace length 32 inches.

Eye Protector

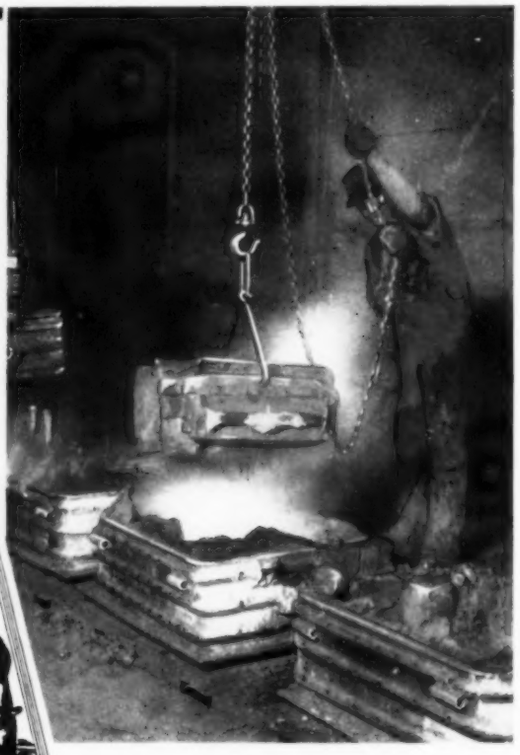
Jackson Electrode Holder Co., Detroit, recently has developed an eye protection device shown in the accompanying illustration. It is a light, adjustable, transparent shield that will not ignite spontaneously and is claimed to offer effective protection from hot sparks, dust and flying particles. The visor, available in clear, smoked, amber, light green

or dark green material, is attached to a comfortable headgear, is well ventilated. Transparent visor has a metal binding to assure stiffness. A spark deflector guards the space between visor and forehead without cutting off ventilation. A fire proof duck skull cap extends half way back over the head to protect head and hair. The shield is said to provide adequate and comfortable protection not only on metal pouring and some grinding operations, but also on soldering, brazing, gun, spot and flash welding.

Electric Lamp

Mine Safety Appliances Co., Braddock and Meade streets, Pittsburgh, has placed on the market two new electric hand lamps which are said to provide greatly increased beam power and length of battery life. The lamps, one of which is shown in the accompanying illustration, combine nickel-alkaline storage batteries with special reflector heads. One lamp develops a beam of 25,000 candle power while the other a beam of 12,000 candle power.

Easy TO HANDLE! Hard TO ABUSE!



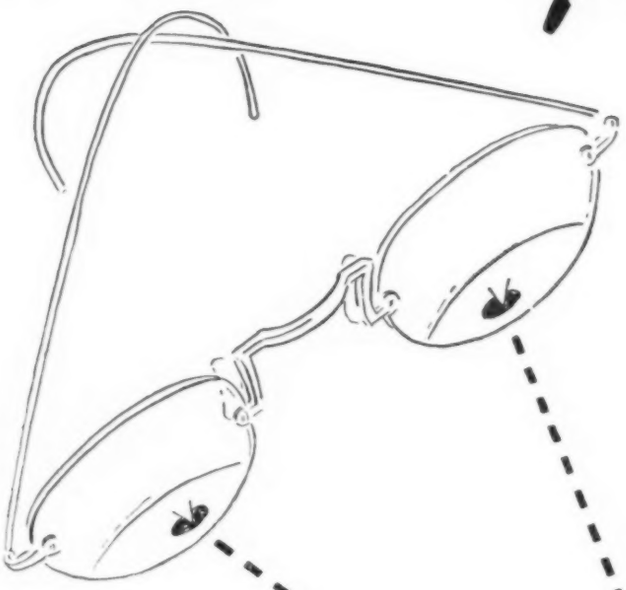
More work with less effort is accomplished with Truscon Copper-Bearing Steel Foundry Flasks. Excess weight is eliminated because it is unnecessary. Rugged strength of Truscon Flasks is obtained by design and construction rather than dead, useless weight. • Make your next order for foundry flasks read "TRUSCON." Your molders will like them. Write for catalog which illustrates and explains Truscon Steel Flasks for light, medium and heavy castings handled by one man, two men or by power equipment.

TRUSCON STEEL COMPANY • FOUNDRY FLASK DIVISION
6100 TRUSCON AVENUE • CLEVELAND, OHIO
SUBSIDIARY: Republic Steel Corporation

TRUSCON

COPPER-BEARING STEEL FOUNDRY FLASKS

Don't bring Binoculars!



Bifocals will be O.K. and your problems will be dissected, discussed and the solution portrayed right before your eyes. Forty-four leaders and co-leaders are busy preparing for the 16 clinics. Come, contribute, and learn.

A few of the clinic subjects:

Extra-curricula activities
Selling advertising to the sales force
Performance data and photographs
How to sell the management
Direct mail for the industrial advertiser
Making exhibits profitable
How to determine readership values
Publicity—how to prepare it
Market information—how to get it

OTHER EVENTS YOU WON'T WANT TO MISS

IDENTICAL INTEREST LUNCHEONS
TRADE SHOWS—EXHIBITS—AWARDS
PUBLISHERS' RECEPTION—DINNER—SHOW
N.I.A.A. DAY AT THE WORLD'S FAIR

•

NEW LOW TRANSPORTATION COSTS THIS YEAR

NO INCREASE IN RATES AT THE HOTEL NEW YORKER

•

GET YOUR RESERVATIONS IN EARLY THIS YEAR

National Industrial Advertisers Association
100 East Ohio Street **Chicago, Illinois**
4-39

OBITUARY

HERBERT M. BOYLSTON, 58, retired head of the metallurgical department, Case School of Applied Science, Cleveland, died recently at his summer home at Edgartown, Mass. Born in Brooklyn, N. Y., Mr. Boylston attended Harvard university, where he was graduated in 1903. After taking a degree in metallurgy in 1905, he remained at Harvard as an instructor until 1909. From then until 1920, when he went to Case, he was managing partner of a private company including himself and Prof. Albert Sauveur. He was co-inventor of the Sauveur patented magnetic specimen holder and the Sauveur-Boylston vertical magnifier and aided in the development of photomicrographic apparatus. Prof. Boylston was the author of the book, *Introduction of the Study of Metallurgy* which has been adopted by a number of American colleges as a text. He headed the metallurgical department at Case for 18 years until he retired last September because of ill health.

* * *

William Wallaesa, 71, foundry instructor at Lafayette college for the past 25 years, died July 24. Mr. Wallaesa was a molder by trade and had been connected with the foundry industry for many years.

* * *

Chester C. Edmunds, chairman of the board, McLain Fire Brick Co., Pittsburgh died July 28 in that city.

* * *

James Sayer, 61, purchasing agent for the Abendroth Brothers Foundry, Port Chester, N. Y., for 25 years, died recently in that city.

* * *

William F. Schultheiss, 67, president and founder of the Public Service Brass Corp., Huntington Park, Calif., died recently at his home at San Marino, Calif.

* * *

Edward Durkin, since 1916 superintendent of the open hearth furnace department, Longue Pointe works, Canadian Car & Foundry Co., died recently at the age of 54.

* * *

F. T. Spikerman of Spikerman & Oyster, Inc., Cleveland, died July 7 following an operation. Previous to the organization of Spikerman & Oyster, Mr. Spikerman was associated with the Osborn Mfg. Co., Cleveland, in the sales department and with SPO, Inc., Cleveland, as president in charge of sales.

* * *

Fred W. Coombs, 69, vice president, Gisholt Machine Co., Madison, Wis., until his retirement in 1937, died recently in a hospital in Orlando, Fla. He had been with the firm more than 40 years, starting as time clerk and bookkeeper. During the World war he was manager of the Northwestern Ordnance Co.

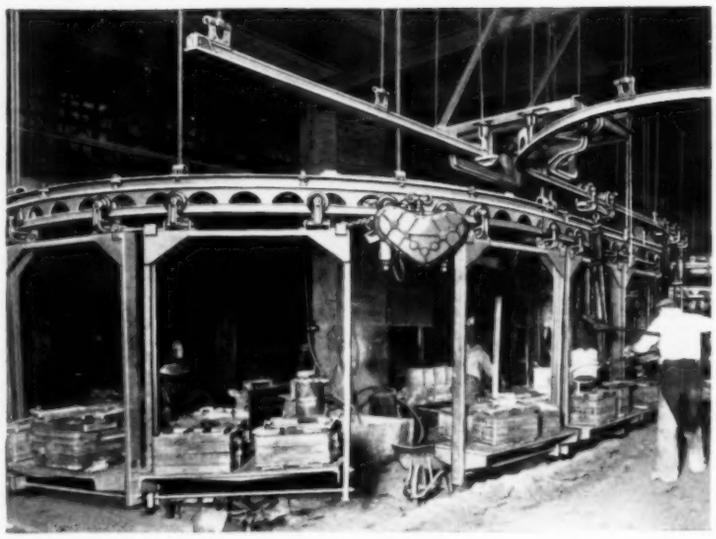
* * *

John R. Booher, aged 61, died Aug. 15. For the past 17 years Mr. Booher has been advertising manager of Cleveland Crane & Engineering Co., Wickliffe, O. Prior to that time he was with the Leutkemeyer Co., Pittsburgh, Doubleday-Hill Electric Co., Pitsburgh, Westinghouse Electric Co., Pittsburgh and Cleveland, and the Cuyahoga Power Construction Co., Cleveland.

Link-Belt Co., Chicago, has organized a subsidiary, Link-Belt Speeder Corp., 341 West Pershing road, Chicago, to manufacture and sell power operated excavating and materials handling shovels, draglines, and cranes. Alfred Kauffmann is chairman of the board and T. M. Deal, president of the new organization.

CLEVELAND TRAMRAIL

OVER HEAD HANDLING EQUIPMENT



675 MOLDS EVERY HOUR

- Every hour 675 molds are carried to the pouring section and then through cooling and shakeout areas on this Cleveland Tramrail continuous mold handling system.
- Because travel machinery is overhead away from dirt and hot metal, production interruptions and maintenance is kept at a minimum.

ALSO BUILDERS OF CLEVELAND CRANES ALL WELDED

CLEVELAND TRAMRAIL

DIVISION OF

THE CLEVELAND CRANE & ENGINEERING CO.

1155 Depot St.

WICKLIFFE, OHIO.

Or Consult Your Phone Directory under Cleveland Tramrail

ANNOUNCING Cleanblast "ALLOY 99"

An entirely new alloy shot for all metallic blast cleaning operations, now offered to the foundry, forging, heat treating and metal industries for the first time.

"Cleanblast Alloy 99" developed, tested and produced only by us, will clean more than twice the work of any standard metallic abrasive blast material. It is designed for plants turning out particular work requiring the best blasting materials, less loss through exhaust systems and the minimum addition of new shot during blasting operations.

"Cleanblast Alloy 99" costs less in the long run and is equally efficient in airless and pressure blasting operations.

Available in Shot—sizes No. 5 to No. 30

"Cleanblast" alloys are patented.

WRITE, WIRE OR PHONE FOR FULL INFORMATION

ALLOY METAL ABRASIVE COMPANY

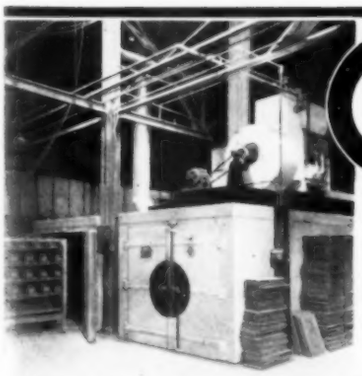
311 W. HURON STREET — ANN ARBOR, MICH.

GOOSE LAKE

Illinois Clay Products Company

JOLIET, ILL.

Fire Clay and
Fire Clay Flour
Fire Clay Brick
Therm-O-Flake Insulation



COLEMAN RACK TYPE OVENS WITH COLEMAN AIR HEATER AT NATIONAL BRONZE & ALUMINUM CASTINGS CO., CLEVELAND, O.

COLEMAN

CORE AND MOLD OVENS

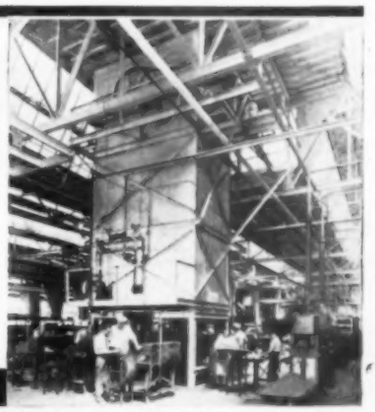
- TOWER OVENS
- TUNNEL OVENS
- PORTABLE RACK TYPE OVENS
- ROLLING DRAWER OVENS
- CAR TYPE OVENS
- FOR USE WITH ANY FUEL

WRITE FOR COMPLETE CATALOGS

The FOUNDRY EQUIPMENT CO.

• COLEMAN AND SWARTWOUT OVENS •

CLEVELAND, OHIO



ONE OF A BATTERY OF COLEMAN TOWER OVENS AT THE BENDIX PRODUCTS CORP., SOUTH BEND, IND.

FOUNDRY ACTIVITIES

MONARCH ALUMINUM MFG. CO., Cleveland, recently added a Dycast Products division with David Benjamin as general manager of the division. The Dycast division will produce die castings from aluminum and zinc alloys up to 16 pounds in weight.

* * *

Chicago Malleable Casting Co., Chicago, has established a record of 600 days, or more than one year and a half, without a single lost time accident, with 400 employes. Over a long period of years the company has taken an active part in the organized safety movement. W. L. Beaudway, vice president and general manager has served for a number of years on the board of directors of the Greater Chicago Safety council and was instrumental in organizing the Greater Pullman group which includes the industries located in Pullman, West Pullman and Roseland sections of Chicago. Leonard F. Hartwig, works manager of the malleable foundry, has served 3 years as general chairman of the Greater Pullman safety group.

* * *

Vancouver Iron & Steel Co., Vancouver, Wash., was damaged to the extent of $40,000 by fire recently.

* * *

Waupaca Foundry, Waupaca, Wis., recently was damaged by fire. The loss is estimated at $3200.

* * *

A 140-foot chimney of the old Co-Operative Foundry, Rochester, N. Y., recently was wrecked.

* * *

Glascock Stove & Foundry Co., West Lee street, Greensburg, N. C., will erect an addition containing 10,000 feet of floor space.

* * *

Index of foundry equipment orders for July, according to a report of the Foundry Equipment Manufacturers' association, Cleveland, was 111.9 as compared with 134.6 in June and 74.2 in July, 1938. Index

(*Concluded on page 98*)

Here's a
BETTER WAY

Type GPTA The Cincinnati Pedestal Grinder

. . . The Cincinnati General Purpose Grinders. They set a new high standard for economical production . . . Motors are fully enclosed, dirt and dustproof. Wheel guards fully enclosed and adjustable. Push button starter with overload protection. Extra heavy pedestal. Large tool tray and water pot.

Write for descriptive folder on THE CINCINNATI General Purpose Grinders and Buffers.

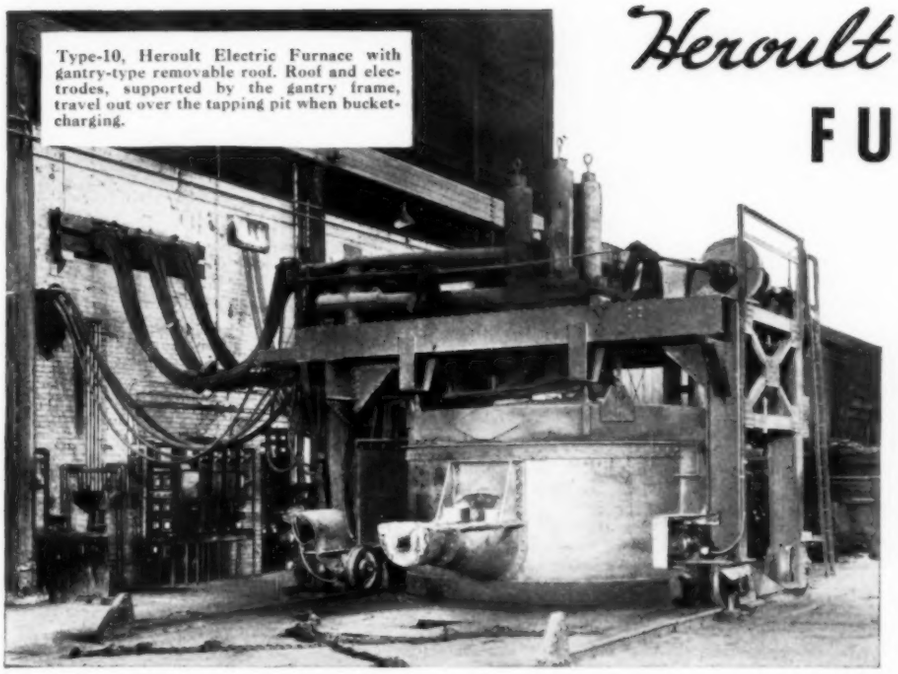
Electric Drills
Screw Drivers
Nut Setters
Tappers
Aerial Grinders
Tool Post Grinders
Bench and Pedestal Buffers
Bench and Pedestal Grinders
Abrasive Cut-off Machines

The Cincinnati
ELECTRIC DRILLS • GRINDERS • BUFFERS • PORTABLE TOOLS
The Cincinnati Electrical Tool Co.
DIVISION OF THE R & L BLOND MACHINE TOOL CO.

2678-4 MADISON RD.
CINCINNATI, OHIO

RAW MATERIAL PRICES
Aug. 19, 1939

Iron	
No. 2 foundry, Valley	$21.00
No. 2 Southern Birmingham	17.00
No. 2 foundry, Chicago	21.00
No. 2 foundry, Buffalo	21.00
Basic, Buffalo	20.00
Basic, Valley	20.50
Malleable, Chicago	21.00
Malleable, Buffalo	21.50
Charcoal iron, furnace	25.00
Coke	
Connellsville beehive premium	$5.50 to $6.30
Wise county beehive coke	5.50 to 6.50
Detroit by-product delivered	10.25
Scrap	
Heavy melting steel, Valley, No. 2	$14.00 to $14.50
Heavy melting steel, Pittsburgh, No. 2	14.00 to 14.50
Heavy melting steel, Chicago, Auto No. 2	10.50 to 11.00
Stove plate, Buffalo	11.50 to 12.00
Stove plate, Chicago	7.75 to 8.25
No. 1 cast, mchy., New York	12.00 to 12.50
No. 1 cast, mchy., Chicago	12.00 to 12.50
No. 1 cast, Pittsburgh	15.50 to 16.00
No. 1 cast, Philadelphia	16.50 to 17.00
No. 1 cast, Birmingham	14.00 to 14.50
Car wheels, iron, Pittsburgh	16.00 to 16.50
Car wheels, iron, Chicago	14.00 to 14.50
Railroad malleable, Chicago	15.00 to 15.50
Malleable, Buffalo	14.00 to 14.50
Nonferrous Metals	**Cents per pound**
Castings copper, refinery	10.12½
Straits tin	48.85
Aluminum, 99 per cent	20.00
Aluminum, No. 12 (Secondary, standard)	11.75 to 12.25
Lead, New York	5.05
Antimony, New York	12.00
Nickel, electro	35.00
Zinc, East St. Louis, Ill.	4.75



Type-10, Heroult Electric Furnace with gantry-type removable roof. Roof and electrodes, supported by the gantry frame, travel out over the tapping pit when bucket-charging.

Heroult ELECTRIC FURNACES

AMERICAN Bridge Company offers an improved series of Heroult type electric furnaces especially designed for effective melting and refining of ferrous materials, and particularly suited to produce high-grade alloy and stainless steels, iron or steel castings.

Heroult Furnaces are sturdily built, and equipped with the most modern electrical and mechanical appliances for efficient, economical and safe operation. Dependent on size and operating conditions, they are adaptable to hand, chute, machine or overhead drop-bottom bucket charging. Available capacities range from ½ to 100 tons.

You are invited to call freely upon the specialized experience of our furnace engineers.

AMERICAN BRIDGE COMPANY

General Offices: Pittsburgh, Pa.

Offices in New York, Philadelphia, Chicago and other principal cities.

Columbia Steel Company, San Francisco, *Pacific Coast Distributors*
United States Steel Products Company, New York, *Export Distributors*

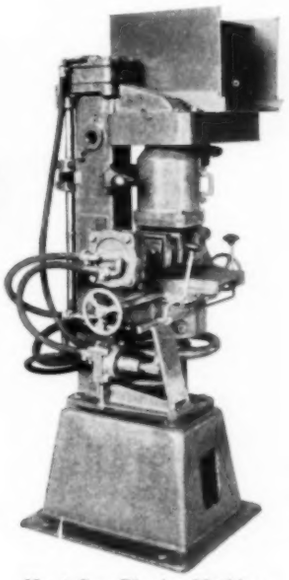
UNITED STATES STEEL

THE NEW No. 0

CORE BLOWER

designed for small core work, such as brass plumbing goods and small fittings.

Fast—easy to use—economical in first cost and repairs.



No. 0 Core Blowing Machine

Write for Specifications and Price

CORE BLOWERS FOR ALL REQUIREMENTS

WM. DEMMLER & BROS.
KEWANEE, ILLINOIS

CLEVELAND CHAPLETS

For dependability - - and most improved designs for easy use, standardize on Cleveland Chaplets.
Samples are convincing - - write for them today.

All types, sizes --since 1890

CLEVELAND CHAPLET & MFG. CO.,
W. 67th St. and N.Y.C. Ry., CLEVELAND, OHIO

(*Concluded from page* 96)

of shipments was 135.5 as compared with 148.5 in June, and 105.8 in July, 1938.

* * *

Greenlee Bros. Co., 2136 Twelfth street, Rockford, Ill., recently began construction of a one story brick building 40 x 40 feet.

* * *

An addition to the shop and foundry of the C. F. Braun Co., 1000 South Fremont street, Los Angeles, is being erected at a cost of $33,000.

* * *

Keeler Brass Co., Grand Rapids, Mich., has plans for a one-story factory addition costing approximately $50,000. Robinson, Campau & Crowe, Grand Rapids, engineers.

Trade Publications

RUBBER GOODS—Manhattan Rubber Mfg. division, Raybestos-Manhattan, Inc., 94 Townsend street, Passaic, N. J., has issued a catalog of mechanical rubber goods describing such items as belting, hose, packing, molded rubber goods, asbestos friction material, rubber roll coverings, tank linings, and abrasive wheels. It also contains transmission belt engineering data.

SPRAY GUN—Metallizing Co. of America Inc., 1351 East Seventeenth street, Los Angeles, has prepared a 26-page booklet giving details on metal spraying.

TOOLS—Severance Tool Mfg. Co., 1514 Genessee avenue, Saginaw, Mich., has issued catalog listing available shapes and sizes of its midget milling cutters.

AIR CONDITIONING—Bulletin published by Wagner Electric Corp., 6400 Plymouth avenue, St. Louis, illustrates and describes its line of air freshening and cooling equipment.

HAND TOOLS—Bonney Forge & Tools Works, Allentown, Pa., has issued a catalog No. 39 of 92 pages covering a full line of alloy steel sockets, wrenches and small hand tools.

SWITCHBOARDS—Small plant and industrial alternating current switchboards with knife switches and fuses are described in a leaflet of Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

FOUNDRY EQUIPMENT—Scully-Jones & Co., 1901 South Rockwell street, Chicago, has issued a 48-page catalog, list No. 67 covering its complete line of used and reconditioned foundry equipment.

FACE SHIELD—Bulletin covering a new line of face shields which are used to protect workers from dust, sparks, heat and glare, has been published by the Davis Emergency Equipment Co., 55 Van Dam street, New York.

BRONZE ALLOY—Johnson Bronze Co., 310 South Mill street, New Castle, Pa., has issued a catalog listing ledaloyl bearings and bushings giving inside and outside diameters and lengths, also designating which sizes are carried in stock.

HOISTS—Conco Engineering Works, division of H. D. Conkey & Co., Mendota, Ill., has issued a folder describing its new electric hoist of 250, 500 and 1000 pound capacities. Construction details are illustrated and specifications given.

Copies of any of the literature listed here may be obtained by writing directly to the companies involved, or by addressing THE FOUNDRY, in care of Readers' Service Department, 1213 West Third Street, Cleveland

CLEANING EQUIPMENT — American Foundry Equipment Co., 533 South Byrkit street, Mishawaka, Ind., has issued a folder describing its testing laboratory for cleaning castings recently installed at its factory, and explaining its purpose.

FIRE BRICK—A. P. Green Fire Brick Co., Mexico, Mo., has issued an 8-page bulletin describing the company's various grades of brick and explaining the process of vitrification. Applications are listed, and the temperatures each type of brick is designed for are given.

COMPRESSORS — Chicago Pneumatic Tool Co., 6 East Forty-Fourth street, Chicago, has issued supplement B to bulletin No. 726 which describes its horizontal tandem duplex compressors. Details of construction as well as installations are presented.

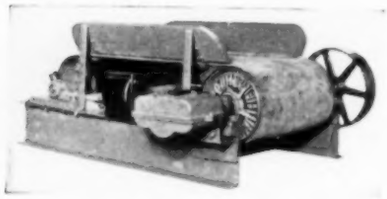
WASHROOM LAYOUTS — Bradley Washfountain Co., West Michigan street, Milwaukee, has selected ten representative washroom layouts from its files and these are reproduced in booklet form, together with facts pertaining to fixture capacities and clearances.

PACKAGING—"Stopping Profit Leaks beyond the Production Line" is a new 22-page booklet distributed by Acme Steel Co., 2840 Archer avenue, Chicago. The booklet describes the causes of ex-

(*Continued on page* 100)

Is Your Toughest Competition

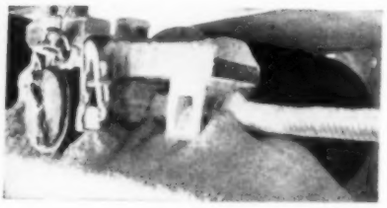
Hundreds of old magnetic pulley separators installed in the horse and buggy days are today raising maintenance and operating costs, giving inefficient service—bottle necks to smooth, economical competitive production so necessary with today's stream-lined industrial progress.



Progressive foundries are profiting by the installation of STEARNS improved, powerful, air cooled, better engineered magnetic pulleys and magnetic pulley separators. Note compact, clean, built for hard and exacting service, design of the Stearns magnetic pulley unit above. Compare it with the obsolete (exposed collector rings) pulley at the right, a costly piece of magnetic equipment to have around in these modern times.

Let Stearns engineers help you solve your sand reconditioning problems. Our many years of experience in designing magnetic separators for foundries is available so that you can secure the advantages of the many exclusive, better engineered features of design and construction that constant research and development have built into Stearns products.

Get our estimates on replacing your old magnetic separators with the new improved designs. They will pay for themselves many times over. Consult magnetic headquarters.



Our Bulletin 301 on Magnetic Pulleys is yours. Write for it.

SEPARATORS — DRUMS — ROLLS
CLUTCHES — BRAKES — MAGNETS

STEARNS-MAGNETIC MILWAUKEE

STEARNS MAGNETIC MFG. CO.

662 So. 28th Street, Milwaukee, Wis.

"EVERY USER IS A BOOSTER"

The Oliver No. 299

SINGLE SURFACE PLANER

Design of this new "Oliver" single surface planer marks it as a helpful, economical addition to your shop equipment. Floor space, 38" x 48". Will surface up to 24-inch wide and 8-inch thick, at any speed from 18 to 40 feet per minute. Pieces as short as 10½ inches will feed through one at a time. Centralized finger tip control. Adjustment of all units made quickly from the outside.

Other Machines by "Oliver"

Band Saws	Jig Saws	Sanders
Boring Machines	Lathes	Shapers
Circular Saws	Pattern Millers	Surface Planers
Tool Grinders	Mortisers	Wood Trimmers
Jointers	Routers	Vises

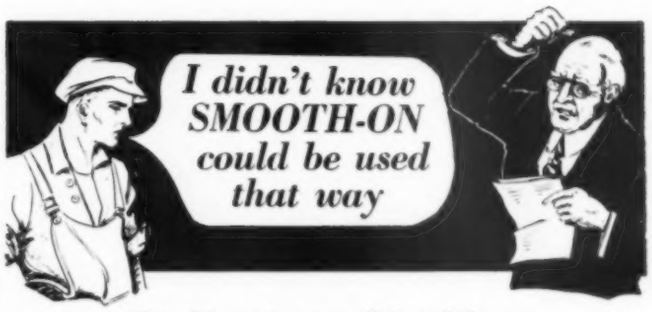
Send for detailed Literature!

Oliver Machinery Company
Grand Rapids, Michigan, U.S.A.
HIGH GRADE MACHINERY

WORK GOES FASTER
with this LIGHTER core plate

AS SOON AS you start using J-M Transite Core Plates, you begin to save. Made of asbestos fiber and cement, they are strong and durable, yet weigh only one-quarter as much as metal plates of equal thickness. One foundry worker can easily handle twice the load . . . production capacity is sizably increased. Furthermore, Transite Core Plates are absolutely non-corrodible, and highly resistant to cracking, breaking and warping. A test installation will show you the many savings you can make with these modern, lightweight core plates. For details, write Johns-Manville, 22 East 40th St., New York, N. Y.

JM JOHNS-MANVILLE
TRANSITE CORE PLATES



Don't get caught with a report of heavy rejections!

SMOOTH-ON No. 4

filled into *harmless* surface pits will true the contour, and match the color, texture and finish of the surrounding metal perfectly, thereby saving castings that would otherwise have to be scrapped, or that would make a bad impression as to quality.

Smooth-On No. 4 is applied like putty, and hardens into metallic iron within an hour or two after application. Its judicious use saves a substantial annual tonnage, although the cost of all the Smooth-On used in a year may be repaid in the reclamation of a single large casting.

Once you realize how easy Smooth-On No. 4 is to use and how well it does its work, you will never be without it.

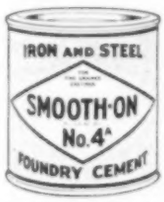
Three compositions, each with distinct color, degree of lustre and fineness of grain offer a choice for perfect match in iron and steel castings of any shade, appearance and quality.

Smooth-On No. 4AA. For light gray castings and machined surfaces. Has high metallic lustre and takes a fine machine finish

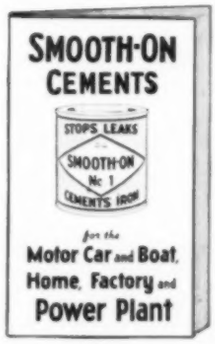
Smooth-On No. 4A. For medium gray castings. A fine-grained cement that has a good metallic lustre

Smooth-On No. 4B. For dark gray castings. A cement of coarser grain and darker shade

Make a critical test, and you will find your filling problems well solved.



Smooth-On Nos. 4AA, 4A and 4B is packed in 1-lb. and 5-lb. can, 25-lb. pail or 100-lb. keg. Mail coupon for prices and free hardened samples.



Smooth-On Mfg. Co., Dept. 17,
570 Communipaw Ave.,
Jersey City, N. J.

Send Smooth-On Handbook.

Send Smooth-On samples of ☐ No. 4AA ☐ No. 4A ☐ No. 4B Smooth-On

Name.....

Address.....

.....

Do it with SMOOTH-ON

(*Continued from page* 98)
cessive packing and shipping costs and methods for eliminating those costs.

GRINDERS—Rotor Tool Co., 17325 Euclid avenue, Cleveland, has issued a 12-page booklet describing four new air grinders recently introduced. These models are for cones and from 4 to 8-inch wheels. Construction details are explained and specifications are given.

COMPRESSORS—Pennsylvania Pump & Compressor Co., Easton, Pa., has issued a 12-page bulletin describing its single stage, horizontal roller bearing type valve compressor. The bulletin contains illustrations showing construction features.

AIR COMPRESSORS—Schramm Inc., West Chester, Pa., has issued a bulletin describing its utility stationary air compressors. Sizes from 85 to 600 cubic feet capacity are listed with operating data, detailed specifications and pictorial design features included.

COMPRESSORS—Bulletin published by the Worthington Pump & Machinery Corp., Harrison, N. J., describes and illustrates feather valve compressors, single cylinder and single stage, motor and steam driven. Construction details are described and specifications given.

GALVANIZING POWDER — American Solder & Flux Co., Wayne avenue and Berkley street, Philadelphia, has issued a folder discussing applications of its galvanizing powder, its purpose and how it is applied. Also a coating tumbler produced by that company is illustrated and described.

CRANES—Whiting Corp., Harvey, Ill., recently published a booklet entitled "How To Write a Traveling Crane Specification" which covers analysis of service requirements; factors to be considered in specifying cranes; and sample specifications for electric overhead traveling crane.

CONVEYORS—Cleveland Crane & Engineering Co., Wickliffe, O., has issued a folder illustrating applications of its hand or motor operated overhead materials handling systems. These include scrap disposal, charging heat treating furnace, foundry sand distribution, and push button controlled pouring.

GRINDING EQUIPMENT—Swartz & White Mfg. Co., 215 Washington street, Binghamton, N. Y., has issued a 24-page booklet describing flexible shafting and equipment manufactured by that company. The various types of equipment are illustrated and described with specifications given.

CLEANING MACHINERY—N. Ransohoff Inc., 208 West Seventy-first street, Cincinnati, has published a catalog describing its washing, rinsing, drying and burnishing machinery for metal parts. Illustrations of application of custom built equipment are shown as well as standard installations.

SWITCHBOARDS—Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has issued descriptive data describing its small plant and industrial direct current switchboards for control of generators and feeders used for general power and lighting service in small direct current plants.

GOGGLES—Chicago Eye Shield Co., 2300 Warren boulevard, Chicago, has issued a catalog describing goggles the company makes for chipping, dust protection, and protection from chemicals such as powders, paints and acids. Lenses are listed which protect the eyes from harmful rays.

MOLDING MACHINES—Herman Pneumatic Machine Co., 306 Fourth avenue, Pittsburgh, has issued a folder giving construction details of its new jolt-squeeze molding machine as well as illustrating its plain jarring, jar stripping and jar rollover and pattern drawing machines.

MAGNETIC SEPARATORS — Bulletin No. 93-A describing its line of automatic spout drum magnetic separators, has been issued by Stearns Magnetic Mfg. Co., Milwaukee. The bulletin also contains complete specifications of various sizes for engineers who must adopt them to various conveying and spout systems.

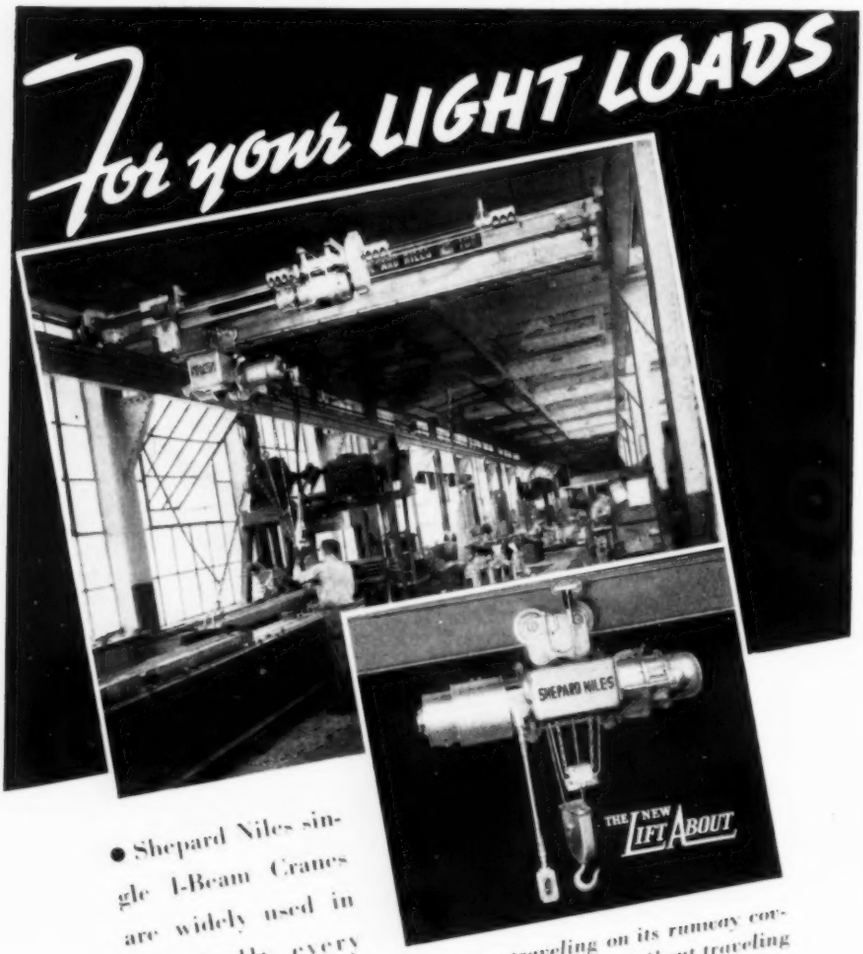
PULLEY—A 4-page folder has been prepared by the Speedmaster Co., division of Continental Machine Inc., 1301 Washington avenue S.E., Minneapolis. Construction details are illustrated and described, as well as specifications given, and applications shown for pulley designed for variable speed control.

STAINLESS STEEL—Atlas Stainless Steel Products, 517 Lyons avenue, Irvington, N. J., has issued a folder listing the characteristics of stainless steel castings, namely that they are heat, corrosive or acid and abrasive resistant. Also many uses of stainless steel are listed with the reason for each application designated.

HYDRAULIC LIFTING CYLINDERS—Curtis Pneumatic Machinery Co., St. Louis, has issued a bulletin describing the mechanical operation of its hydraulic lifting cylinders for industrial uses. Various applications of the device are illustrated and a table listing lifting capacities of different size plungers is included.

REFRACTORY—Laclede-Christy Clay Products Co., 4705 Ridgewood avenue, St. Louis, describes an air setting refractory mix in a folder recently issued. It

(*Concluded on page* 102)



The crane traveling on its runway covers the length — the Lift About traveling on the crane beam covers the width.

● Shepard Niles single I-Beam Cranes are widely used in practically every industry for loads up to five tons capacity.

● This single I-Beam Crane combined with the new Shepard Niles Lift About will cover every square foot of the bay with vertical lifts, eliminating all side pulling and dragging of loads.

A COMPLETE LINE OF CRANES AND HOISTS

SHEPARD NILES CRANE & HOIST CORP.

360 SCHUYLER AVENUE
MONTOUR FALLS, N. Y.

GLOBE

A Standard for Comparison

It takes more than verbal claims to establish any product as a leader in its field. It takes years of experience in manufacture,—years of service under all conditions.

1939 marks the thirty-second year of Globe service to the foundry industry. All of the major improvements in shot manufacture during that time have been Globe developments.

Extravagant claims of "new and better", "hardest", "toughest" and vague references to "special treatments" and "special alloys" mean nothing to experienced shot users. They know the answer lies in operating results over a period of time. That is why experienced users prefer Globe.

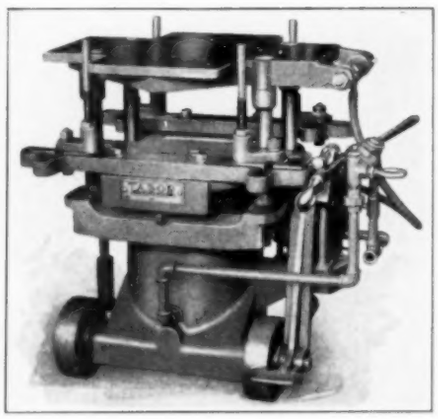
THE GLOBE STEEL ABRASIVE CO., MANSFIELD, OHIO

H.C. CHILLED GLOBE SHOT

SHOT

One of the Complete Line of

TABOR TRADE 1884 MARK **Profit Producers**



JAR FLASK LIFT MACHINE WITH ADJUSTABLE PINS

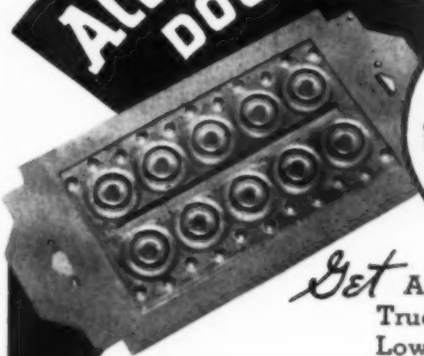
Lifting pins provide for a wide range of flask sizes. A machine for fast production —particularly adaptable to cope molds.

The **TABOR** TRADE 1884 MARK **MANUFACTURING CO.**
6225 Tacony Street
PHILADELPHIA, PA.

Foundry Molding Machines and Equipment

Make **ACCURATE CASTINGS DOUBLY SURE --** *use*

SCIENTIFIC MATCH PLATES — *Pressure Cast*



Get Accurate Partings, True Reproductions, Lower Pattern Costs.

Save Expensive Pattern Duplication Excessive Cleaning Costs.

Avoid Center Shrinks, Draws at Parting.

Write for literature

The SCIENTIFIC CAST PRODUCTS Corp.
1388-1392 E. 40th St., CLEVELAND, O.
505-507 S. Western Ave., CHICAGO, ILL.

ADVERTISING PAGES REMOVED

(*Concluded from page* 100)

is recommended for filling in and smoothing damaged sections of furnaces which would otherwise require rebuilding. Illustrations show typical applications.

FOUNDRY EQUIPMENT — Simplicity Engineering Co., Durand, Mich., has issued a 8-page bulletin No. F-3 describing its gyrating shakeouts and knockouts for use in both production and jobbing foundries. Also described are the company's stationary and portable sand screening units. Illustrations show the equipment in typical applications.

MAGNETS—A new bulletin has been issued by Stearns Magnetic Mfg. Co., 635 South Twenty-eighth street, Milwaukee. The bulletin describes the company's line of suspended magnets and contains information concerning various applications. A hand magnet is described for handling small articles such as castings for surface grinding operations.

REFRACTORIES — New Castle Firestone Co., 225 East North street, New Castle, Pa., has issued an 8-page bulletin describing its natural refractory rock called firestone. Information is given on its advantages, and methods of installation, etc. The firestone may be obtained as handhewn blocks, slabs, chips and spalls, and as firesand.

POWER TRANSMISSION—A 272-page book, No. 1600 has been published by Link-Belt Co., 307 North Michigan avenue, Chicago, as a handbook of modern power transmission units, containing complete design and application data, weights, and cross indexed for convenience of design engineers and plant managers.

PYROMETERS—A 4-page folder covering pyrometers and resistance thermometers has been issued by the Foxboro Co., Foxboro, Mass. The folder describes several of the most familiar instruments manufactured by that company, including: potentiometer indicating recording controller, recording pyrometer, potentiometer controllers for electric or air operated control, etc.

GROUP WASHING—Bradley Washfountain Co., 2203 West Michigan street, Milwaukee, has issued a catalog supplement presenting new developments in the group washing field, including new washfountains, treadle operated showers, shower receptors, redesigned bubbler heads, new soap fixtures and other improvements.

ALLOY IRON—Taylor Foundry Co., Wichita Falls, Tex., has prepared a bulletin describing its high strength alloy iron for a wide variety of castings. The bulletin illustrates the plant with an air view and describes briefly the facilities of the company for supplying a wide variety of castings required through the southwest territory. Information also is given on tensile and transverse strength.

TESTING EQUIPMENT — Harry W. Dietert Co., 9330 Roselawn avenue, Detroit, has issued description and specification sheets on its high temperature laboratory furnace, portable pyrometer for temperatures up to 3200 degrees Fahr., dilatometer, specimen dryer and carbon determinator. These sheets are pocket size and punched for a looseleaf folder.

MAGNETS—Electromagnets Ltd., 48, High street, Erdington, Birmingham, 23, England, has issued a folder describing its permanent magnet equipment for separating iron from other materials. Types of equipment in which permanent magnets are available are chute separator, magnetic drums, magnetic pulleys, suspension type magnets and hand magnet.

CLEANING EQUIPMENT — Pangborn Corp., Hagerstown, Md., has published a 16-page bulletin on its line of standard and auxiliary rotoblast cleaning tables. The bulletin is divided into two sections. The first describes mechanical operation of the single standard tables with general specifications and the second part describes mechanical operation of the multiple spindle auxiliary type table with general specifications.

DUST COLLECTING—Schmieg Sheet Metal Works, Detroit, has issued a catalog giving information on its wet system of dust collecting. The catalog is divided into sections dealing with dust arresting in centralized and localized systems, spray booths, air washers, parts washers, cyclones, and other special equipment designed and manufactured by the company for air cleaning in industry.

BELTING—"Belting Biographies," a 36-page booklet describing the company's line of transmission and conveyor belts has been published by the Mechanical Goods division, United States Rubber Co., 1790 Broadway, New York. The booklet contains technical information including data on selection of proper belt, installation, speed of operation, pulley size, tension, carrying capacity, etc., as well as numerous types of transmission drives and conveyor layouts.

BLAST TANKS—W. W. Sly Mfg. Co., 4700 Train avenue, Cleveland, has issued a bulletin on tanks for pressure blast cleaning. It describes the unit's advantages for cleaning surfaces of forgings, castings, structural steel work, bridges, tanks and buildings from adhering scale, molding sand, dirt and old paint, as well as preparing surfaces for metal coating, mat finishes, etchings, etc. Tables and specifications are presented.

SLOSS QUALITY BEGINS WITH THE ORE—

RESULTS IN A COMBINATION OF

GOOD THINGS FOR FOUNDRIES

ALL-ORE PIG IRON
Smelted from scientific blend of Sloss' own ores. Heavy scrap carrier (add your scrap in the cupola).

UNIFORM PIG IRON
Mixed in specially designed 125-ton ladle (an exclusive Sloss feature). Each pig in a carload is identical in analysis.

FOUNDRY PIG IRON SPECIALISTS
Sloss organization is "Grey Iron conscious"—makes no steel.

SMALL PIGS
Designed for minimum coke consumption.

SHIRT-SLEEVE SERVICE
Sloss field men speak the foundryman's language.

Address inquiries to Sloss-Sheffield Steel & Iron Company, Birmingham, Alabama.

SHIRT SLEEVE SERVICE

SLOSS SPECIALISTS IN FOUNDRY IRON

LADLE-MIXED FOR UNIFORMITY